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High-speed study of specialized textile looms . . . page 18

Drawing-negative technique for layout production . . . page 20

BT camera speeds copying of underwater data . . . page 22

Photo-drawings of scale models facilitate job of draftsman . . . page 28

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1957

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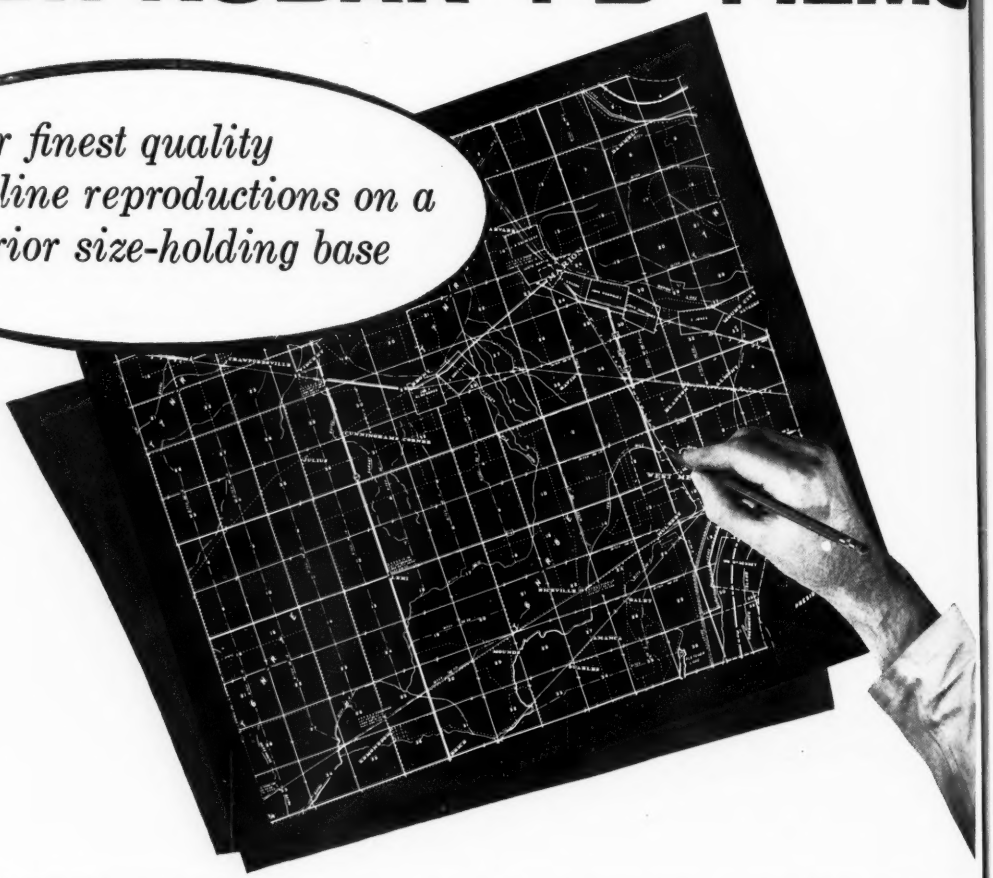

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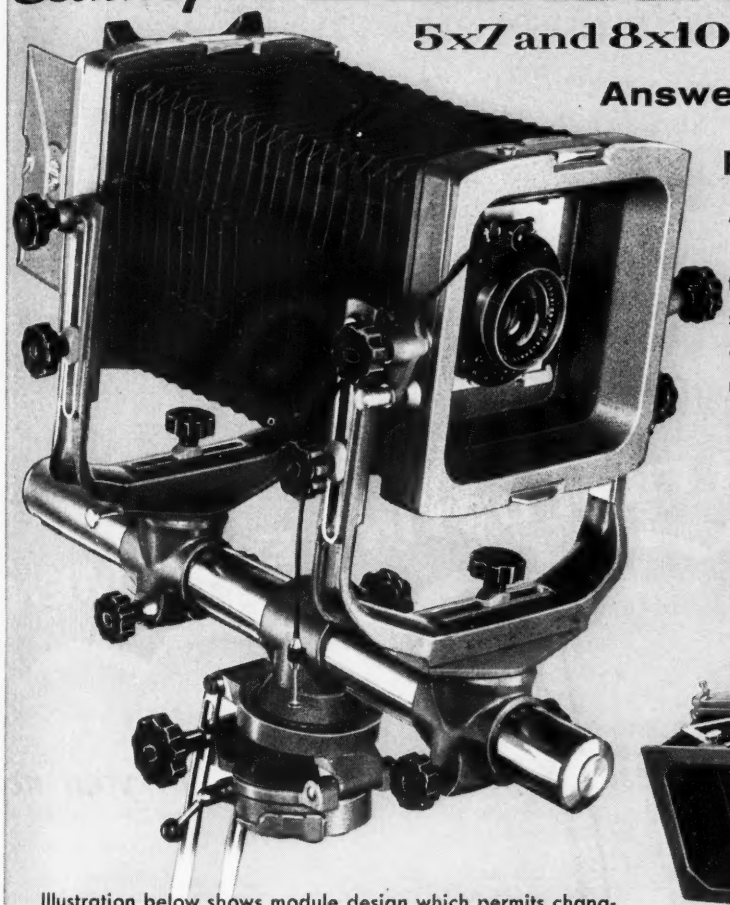

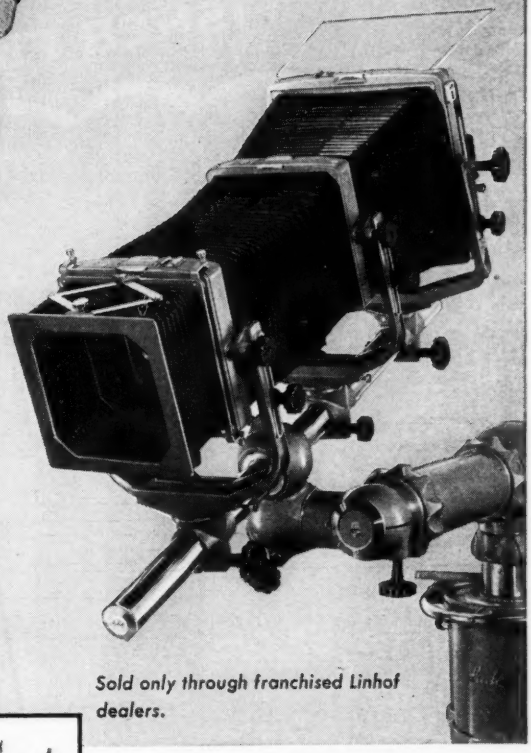

Illustration below shows module design which permits changing from 24-inch extension (Duplex model) to 39-inch extension (Triplex) by adding a larger monorail, bellows and upright. Prices: 5x7 Duplex $425.*; 8x10 Duplex $695.*— Triplex Conversion Outfit (fits either model) $155.* Compendium Lens shade $50. All sizes of reducing backs also available.

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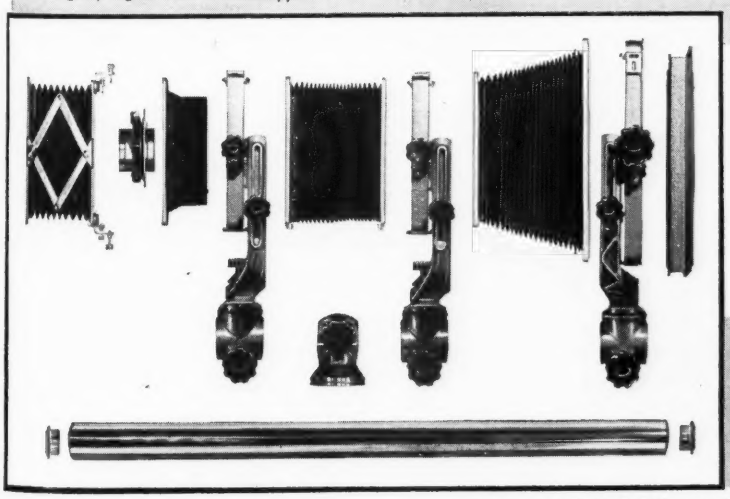

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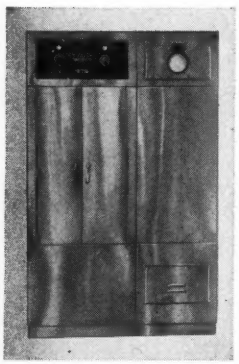

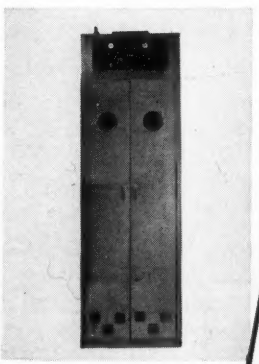

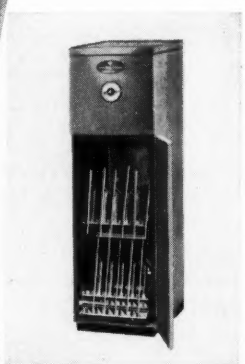

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The Magazine of Photography at Work in Business, Industry, Government and Science

DECEMBER, 1957

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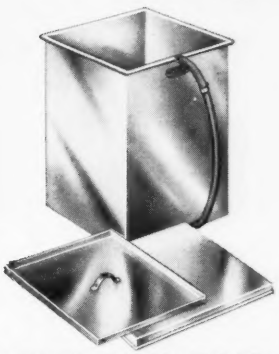

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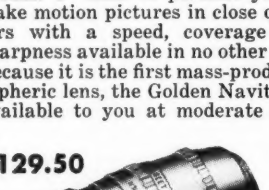

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Editor's Mail

More "Growing Pains"

I was certainly pleased to see your editorial titled "Growing Pains" in your September issue.

Were you looking over my shoulder? Had you sent in spies? This is exactly what is going on in this big firm. You hit the nail on the head. Now, how about another editorial about the ignorance of the department that finally does capture the photographic unit and then proceeds to tell it how to take pictures?

So you suggest that the controller can supervise a Photographic Department! I'd like to testify that he has to be extra smart to do it. All too often cheap unskilled help, misfits, malcontents, political appointees end up in the Photographic Department. Jobs are rushed, prints are poor and the photographers abused and insulted because of the low respect involved in a vicious circle of saving money.

No wonder so few of the $25,000 a year photographers will work for industry as employees. They don't have to take the ignorance and lack of training industrial people usually exhibit when dealing with visual communications. They would rather work for those few found in enlightened public relations departments, magazines, good advertising agencies, or mature research and engineering groups; anywhere where their experience and talent is recognized. There they are their own bosses and can catch their breath to renew their energies for the demands made for creation and imagination.

The controller is so anxious to look good, and he can show such tremendous rate of saving to the company by producing pictures cheaply, he loses sight of the more important reasons the company has a photographic unit.

Saving money is important but the first consideration should be to do the best job; the correct job, not the cheapest or the most expensive, but the *right* job. The company has an opportunity to control and operate this vision for its own communication as well as showing the public the best view of its story.

If the controller is wise enough to see the many important intangible services a Photographic Department can deliver, better communication, convenience, speed and finally public and employee happiness, he should be gratified that there is *any* saving over outside purchasing. In the long run the dollar is applied to photographs correctly in the supply and demand situation of competitive outside work. If the controller is saving all that money the photographers are either badly underpaid or they are not devoting enough time to do each job right.

It all comes down to having the Photographic Department under the control of the person having the broadest and most balanced view of the company operations, its policies and ambitions. Then a good photographer should be hired and paid to deliver photographic services on a business basis without departmental favoritism.—Name withheld.

P. S. Keep up the good work.

We did not suggest that the controller should supervise the Photo Department. We merely stated that was the way one major corporation was doing it.

Writer Wants Reader

I would appreciate your sending me the name and address of the manufacturer of the pocket-size microreader described in your August issue.—Andrew M. Lavish, Washington, D. C.

It is made by Microcard Corp., West Salem, Wis.

Employee A-V Program

We wish to thank you for printing our letter concerning an Employee A-V Program in the September issue of INDUSTRIAL PHOTOGRAPHY. We have had some interesting response. We will certainly advise you of the results. — H. Y. Ivins, Permo, Inc., Chicago.

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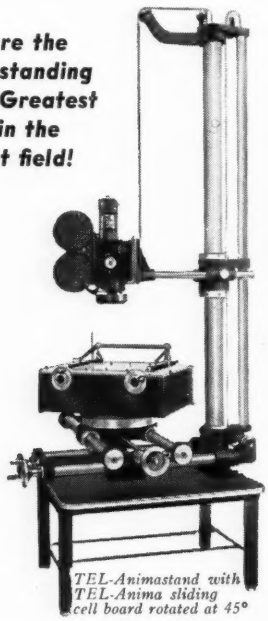

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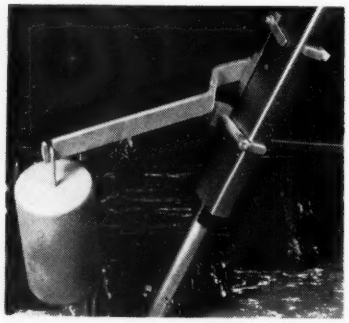
Ingenious Practices

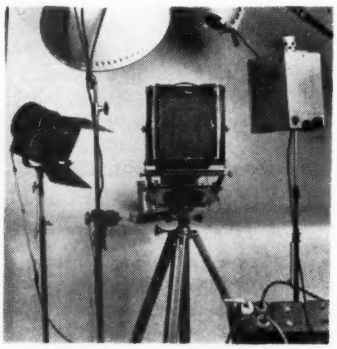
Readers are invited to send their Ingenious Practices to INDUSTRIAL PHOTOGRAPHY, 10 East 40th Street, New York 16, New York.

Tripod Support



To keep the tripod from tipping over when it was supporting a large,heavy camera focused in a vertical position, we made an attachment which easily slips onto the leg of the tripod and holds a weight which keeps the tripod on its feet. The attachment is held in place by a simple locking lever and by the weight suspended from the attachment's arm. The weight is 15½ pounds, sufficient to support our largest camera.—*Ross Sanddal, Hughes Tool Co., Houston, Texas.*

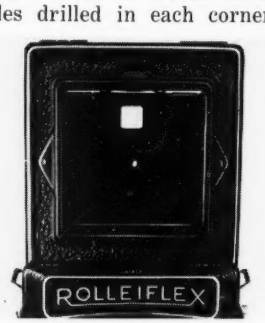
Studio Light Identification



A considerable amount of time is saved by painting each light in the studio a different color and painting each plug to match. In a setup with many lights it is then no longer necessary to trace out the line of any lamp to be disconnected; just look for the matching color. Besides saving time, this practice brightens up the appearance of the studio.—*Werner J. Kuhn, New York, N. Y.*

Bead Sight

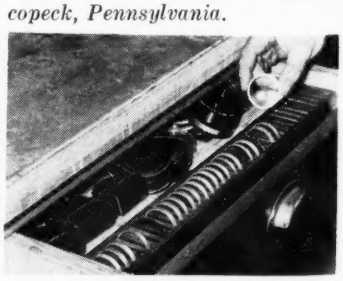
Stopping action can become a snap with a simple but effective bead sight that can very easily be made for any camera. For the Rollei, a 35mm mask for the sportsfinder has the center cut out to conventional 2¼" frame. Wire is woven through holes drilled in each corner of



the mask and a drop of solder placed in the center of the cross hairs.—*Brent P. Bailey, Whittier, California.*

Filter Storage

Filters in storage are usually left in the boxes they are purchased in or loose in a drawer where each must be handled to read the information on the filter rim. By slotting a 1½"x2½" piece of wood, each filter can be placed in its own slot with the name turned to the top so it can be easily read and picked out without handling. This saves the glass surface from finger marks and scratches.—*Don Shiner, Nescopeck, Pennsylvania.*



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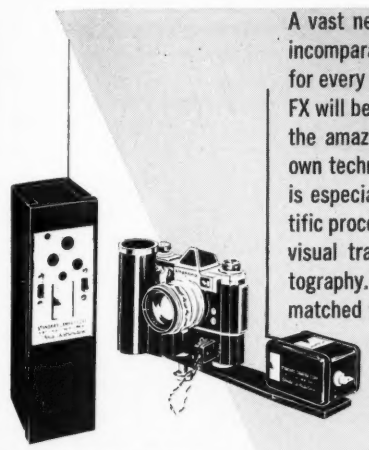

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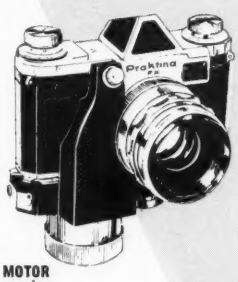
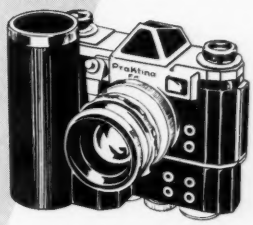
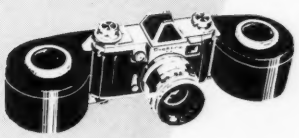


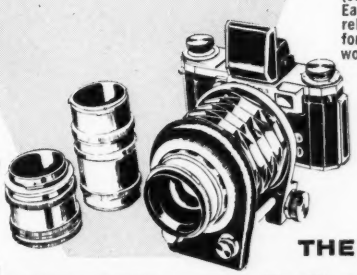
2. RAPID-SEQUENCE SPRING MOTOR
Ten photographs in rapid succession can be taken with a single winding of this powerful spring motor—as fast as you can press the release button!



4. ELECTRIC MOTOR—MAGNETIC REMOTE CONTROL
Permits remote-controlled electrical operation of camera as far as 75 feet away. By a single push-button, the shutter is released, the film advanced, the frame counted and the shutter wound for next exposure. Especially valuable where close-up photography is desirable but where, because of inaccessibility or danger, the photographer must stand at a distance.



5. 50-FOOT CAPACITY BULK-FILM MAGAZINE
Attached to the Praktina FX, it can be used alone or with the Electric Motor or Rapid-Sequence Spring Motor to take 420 successive standard 35-mm. frames (50 feet of film) without reloading. Easily attached to camera, it can be reloaded in daylight. Particularly useful for filming records and microfilming work.



3. EXTENSION BELLOWS AND TUBES
(regular or reverse)
Exceptional aids in macro and micro-photography. Offer optical ranges from life size to more than 10-time magnification. Also available: the new follow-focus lens by Novoflex.

THE INCOMPARABLE

PRAKTINA FX

PRAKTINA FX

Guarantee, Registration and Import Certificates furnished with each camera.

The One and Only 35mm Single-lens Reflex Camera that gives you complete versatility based on leadership in the development of outstanding and functional accessories.

- Internal automatic diaphragm.
- Penta-prism eye-level viewfinder interchangeable with Waist-level finder, both utilizing split-image rangefinder.
- New, separate Newton optical viewfinder for fast action and available light photography.
- New, recessed bayonet mount affords maximum support and split-second lens interchangeability.
- Focal-plane shutter with speeds 1/1000 to 1 second.
- Synchronized for regular and electronic flash.
- Plus many other desirable and exclusive features!

With f2.8 50mm C.Z. Jena automatic Tessar lens **$239.50**
With f2.0 58mm C.Z. Jena automatic Biotar lens **$297.50**
With f1.9 55mm Steinheil automatic Quinon lens **$299.50**

IP-16

Standard Camera Corporation
319 Fifth Avenue, New York 16, N. Y.

Mail this coupon today for your free copy of ☐ "Masterpiece of Simplicity" ☐ "Praktina FX Radio-Controlled Unit" ☐ "Praktina FX Electric Motor" ☐ "Praktina FX Spring Motor" ☐ "Praktina FX 50-Foot Capacity Bulk Film Magazine" ☐ "Follow-focus Lens by Novoflex." They're brand new editions, packed with information about the new, incomparable Praktina FX, its valuable accessories and its many applications for industrial, medical, scientific, governmental, research and other specialized uses.

Name_____

Address_____

City_____ Zone____ State_____

STANDARD CAMERA CORPORATION **Offices and Exhibit: 319 Fifth Avenue, New York 16, N. Y.**

. . . for more details circle 576, page 65

Audio-Visuals

Handling Practices Adopted

The Association of Cinema Laboratories has adopted a set of recommended practices for handling film material for television use. A report covering black and white and color film, was submitted to the group for approval by a committee under William E. Gephart, General Film Lab. Included in the report are sections on camera area dimensions, review room projector apertures, comments on set lighting technique, control of negative and positive prints, and photographic measurements for each type of film stock used. Other nomenclatures are defined and recommended for universal use. After acceptance by ACL, the report will be published and widely circulated.

Offset Press Film Strip

The Lithographic Technical Foundation has just issued Audio Visual No. 17, "Sheet Control on the Offset Press," which is available to subscribers in the organization's AV Demonstration Program.

An Audio Visual is a film strip, used in conjunction with demonstrations and made up of a series of pictures illustrating the methods and techniques being demonstrated, along with a recorded narration.

This finishes the series of four "Press" AV's, earlier numbers of which covered "Inking and Dampening Systems," "The Printing Unit of the Offset Press," and "Packing Cylinders of the Offset Press."

Plant print shops wishing more information should contact the LTF's Educational Offices at 131 E. 39th St., New York 16, N .Y.

Catalogs

▶ *Sterling-Movies U.S.A. Inc.*, 43 West 61st Street, New York 23, New York has announced the 1957-58 version of the catalog "Free Films."

INDUSTRIAL AUDIO-VISUAL EXHIBITION

More than 3,000 executives, producers, and directors in the audio-visual field visited the first annual Industrial Audio-Visual Exhibition during its premier in New York City last month.

Sponsored by the National Visual Presentation Association, the trade show also featured three days of lectures by prominent A-V executives. Some 45 manufacturers exhibited a wide range of products.

Among the lecturers were: John Flory, Eastman Kodak; George Huntington, Television Bureau of Advertising, Inc.; Willis H. Pratt, Jr., American Telephone & Telegraph; Lt./Col. R. A. Bassler, USAF; W. P. Rosensohn, VP, Tele-Prompter Corp.; J. B. O'Connor, Tele-Sessions, Inc.; William J. Glennon, Jr., Equitable Life Assurance, and Dr. Robert Lloyd Cantor, Ronson Corp.

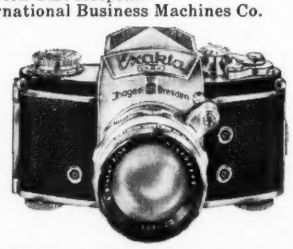
Dr. Robert L. Cantor, Ronson Corp. director of training, is shown at one of lecture series.

Group of prominent lecturers and A-V executives relax at a party given guests by Audio-Master Corp.

EXAKTA

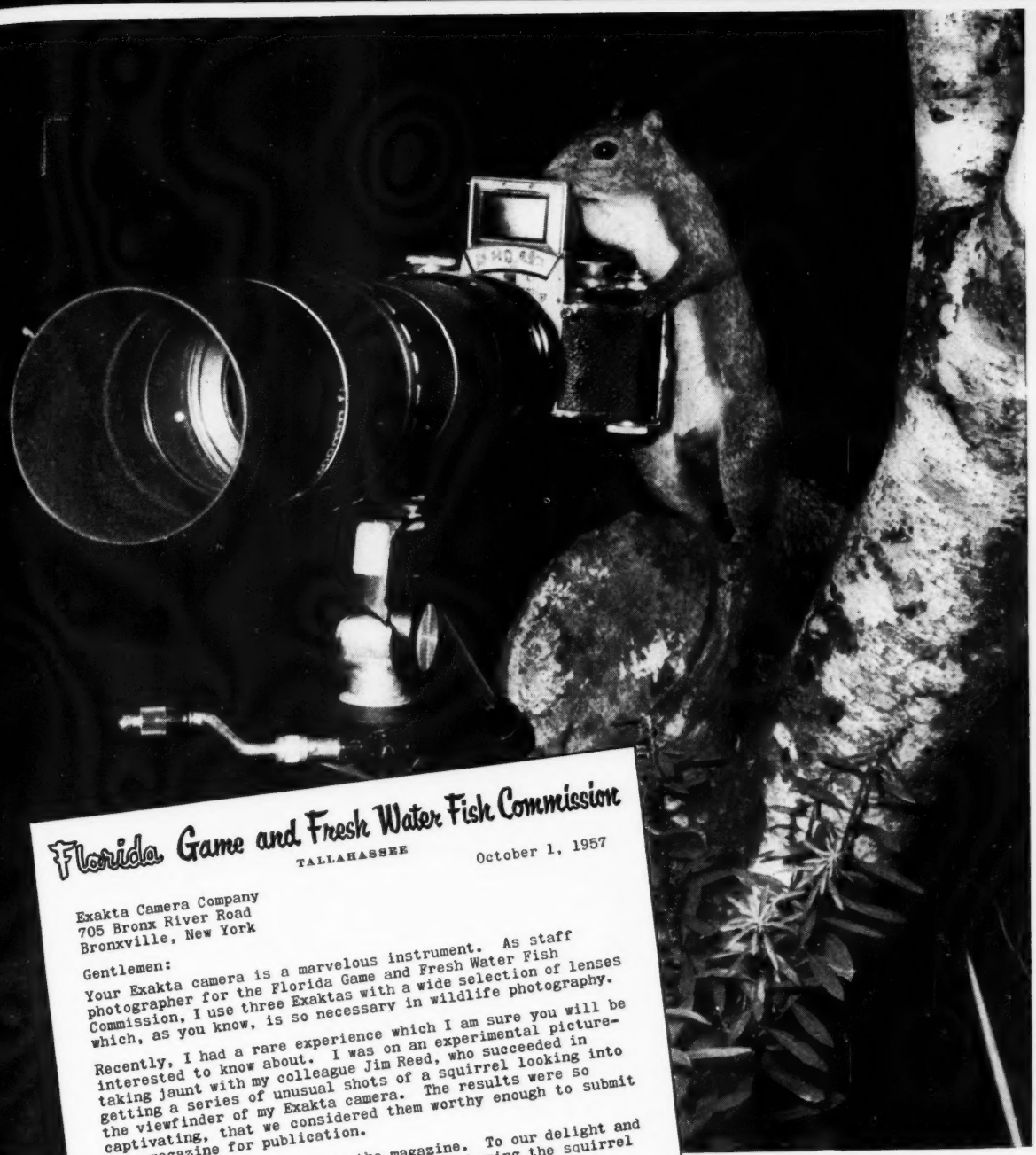
camera owners represent every field of activity . . . industry, science, medicine, education, and government. Here is a partial list of Exakta camera owners from the Exakta Registry File:

Alameda County Sheriffs Dept., Oakland
Alaska Department of Health
Albuquerque Gravel Products Co.
American Airlines
American Can Co.
American Cyanamid Company
American Museum of Natural History
American Seating Company
Appalachian Electric Power Company
Armour and Company
Asbury College
Atlantic Refrigeration Co.
Bayart Products
Beckley Memorial Hospital
Boston University
Brattleboro Publishing Co.
Burroughs Wellcome & Co.
California State Polytechnic College—*2 Exaktas*
Caterpillar Tractor Co.
Centron Corporation Inc.
Chicago Osteopathic Hospital
Children's Hosp. Research Fnd'tion., Cincinnati
Children's Medical Center, Boston
Chronic Disease Research Instit., Buffalo
City of Seattle
Cleveland Museum of Natural History
Coca Cola Co.
Colorado A&M College
Colorado State University
Columbia-Southern Chemical Corp.
Columbia University
Comm. of Game & Inland Fisheries, Richmond
Comm. Game & Fresh Water Fish, Fla.—*3 Exaktas*
Consolidated Laboratories Inc.
Cornell University
Corning Glass Works
Cotton Prod. Assn., Atlanta
Cranbrook Instit. of Science
Creedmore Institute
Cullen Veterinary Clinic, Mankato, Minn.
Dartnell Corporation
Department of Public Safety, Oklahoma City
Detroit Institute of Arts
De Goesbriand Memorial Hospital
Dow Chemical Co.
E. I. Du Pont De Nemours & Co.
Durez Plastics & Chem. Co.
Encyclopedia Britannica
Esso Standard Oil Co.
Explosive Ord. Disposal Tech., Indian Head, Md.
Fresno State College
General Electric Company
Glendale Sanitarium and Hospital
B. F. Goodrich Co.
Graphic Associates, San Diego
Gulf States Utilities Co., Baton Rouge
Hallburton Oil Well Chem. Co.
Harbor General Hospital
Harlam Memorial Hospital
Harvard Biological Laboratories
Houston T.B. Hospital
International Business Machines Co.



EXAKTA CAMERA COMPANY
705 BRONX RIVER ROAD • BRONXVILLE 8, N. Y.

. . . for more details circle 522, page 65



Florida Game and Fresh Water Fish Commission

TALLAHASSEE

October 1, 1957

Exakta Camera Company
705 Bronx River Road
Bronxville, New York

Gentlemen:

Your Exakta camera is a marvelous instrument. As staff photographer for the Florida Game and Fresh Water Fish Commission, I use three Exaktas with a wide selection of lenses which, as you know, is so necessary in wildlife photography.

Recently, I had a rare experience which I am sure you will be interested to know about. I was on an experimental picture-taking jaunt with my colleague Jim Reed, who succeeded in getting a series of unusual shots of a squirrel looking into the viewfinder of my Exakta camera. The results were so captivating, that we considered them worthy enough to submit to a magazine for publication.

Only one picture was sent to the magazine. To our delight and pride, this magazine bought the picture showing the squirrel and the Exakta and soon ran it on a full page.

I am enclosing other pictures which I took of the squirrel looking into the Exakta viewfinder and the shots which led up to it. As you can see, they are all reasonably good and unusual pictures.

I am really sold on the splendid performance and versatility of your cameras. They have proved very satisfactory under the most demanding conditions of my job. I look forward to many more rewarding years of creative adventure with these fine instruments.

Very truly yours,
GAME AND FRESH WATER FISH COMMISSION
BY B. E. Johnson
B. E. JOHNSON, Staff Photographer

BEJ:mns

P. S. The squirrel picture I refer to above appeared in a recent issue of Life Magazine!

Descriptive Exakta Brochure "Operation Squirrel," available free upon request.

EXAKTA CAMERA COMPANY 705 BRONX RIVER ROAD, BRONXVILLE 8, N. Y.

. . . for more details circle 520, page 65

Linhof
TWIN SHANK
PRO TRIPOD

This exceptionally stable professional tripod accepts still cameras to 5" x 7", or 16mm motion picture cameras, yet is light enough to take on location. It has twin tubular legs of sturdy seamless light metal, and strong extension legs of anodized light metal which can be locked at any elevation.

An interchangeable geared center post allows easy height adjustment. For low-angle photography, the geared center post inverts for positioning the camera between the tripod legs. Downward shots are possible with an outrigger adapter allowing the geared center post to be used as a horizontal extension.

Linhof Heavy Duty Pan and Tilt Heads are available for use with still and cine cameras.

Specifications: Height collapsed: 34½"; fully extended 61¼"; fully extended with geared center post: 82"; weight: 8¾ lbs. Twin Shank Pro Tripod with interchangeable camera platform $89.95. Geared Center post $59.95. Outrigger adapter $27.95.

At franchised Linhof Dealers or write to:

KLING
PHOTO CORPORATION
New York 10 • Los Angeles 46

. . . for more details circle 546, page 65

Association News

PAA Becomes the PPA

An announcement in their November Newsletter reveals that the Photographers' Association of America has changed its name. The notice states that "By action of the Secretary of State of Delaware, the Charter of incorporation of the PA of A has been amended and the Association is now legally known as *Professional Photographers of America, Inc.*" Public announcement of the new name is planned for January 1, 1958.

SPSE Announces Programs

The season's first meeting of the Rochester Chapter, *Society of Photographic Scientists and Engineers* was devoted to photography in research and engineering. Speakers were Richard C. Kinstler, Procter and Gamble, and Edward Purrington, Ford, whose spoke on "Commercial Photography as Applied to Industry." Future meetings will stress aerial photographic interpretation and high-speed processing.

Topics for the December meeting are "A High Speed Color Film for Specialized Use" and "High Speed Processing of High Resolution Film and Computer Output Recording for Air Defense."

Other programs are: January —"Log-Etron, 1957" and "Aerial Photographic Interpretation"; February — "Milestones in Motion Picture History"; March— "Photographing Science for 'Life'" and "'Life' Photographic Laboratories"; April — a field trip and technical meeting.

Record Photography Discussed

Various aspects of record photography were discussed at the recent meeting of the *Long Island Industrial Photographers Association.* Frank Lobaugh, Jr. and Harry Cuenin of Recordak gave a recorded talk with slides and a practical demonstration of their company's system. The silver transfer process of duplicating was covered by Coleman Markman of Peerless Photoproducts. His talk explained the Dri-Stat, Auto-Stat, Agfa and Remington processes, and pointed to the developments to be brought about by the new monobath-stabilizer techniques.

IPAA Tenth Anniversary

E. S. Purrington, Ford Motor Co. Photo Department manager, will be honored for "his many contributions to the industrial photographic industry" during the Tenth Anniversary Dinner of the *Industrial Photographers Association of America.* The dinner will be held January 30 in the Bow and Arrow Manor, East Orange, N. J. For dinner reservations contact IPAA, 1050 Broad St., Newark.

NYSMPTE Elects

Officers for 1958 have been elected by the New York Section of the *Society of Motion Picture and Television Engineers.* Burton F. Perry is the chairman while the new secretary-treasurer is Robert M. Fraser. Six managers were also chosen.

The section's last meeting dealt with Noise Control Problems in Motion Picture and Television Recording.

VSP Elects, Awards

Elections of officers and directors were held at the annual meeting of the *Volunteer Service Photographers, Inc.,* Mrs. Paul W. Gibbs of Riverdale, N. Y. is the new president. Other officers, for 1957-58, are Mrs. Joseph G. Dombroff and Mrs. Albert M. Lee, vice-presidents; Alouise Boker, APSA, secretary; Frank J. Soracy, APSA, treasurer.

At a luncheon held during the recent annual meeting of the National Association of Photographic Manufacturers VSP'S first Joseph G. Dombroff Memorial Award was presented to George C. Connor, General Sales Manager of Sylvania's Photolamp Division.

NOW...

RCA "LIFE-TESTED"* 16mm Projectors scoop the field

with great new design advances!

FEATURING **great new BUILT-IN LUBRICATION!** No more lubrication needed for the life of your RCA Projector. Oil-impregnated sintered metal parts run quietly as a cat hundreds and hundreds of hours.

FEATURING **great new LONG LIFE FILM PRESSURE GUIDES!** Nylon sprocket shoes and synthetic-sapphire pressure shoe treat film with wholly new light touch, protect it from wear at all critical contact points in film path.

FEATURING **great new BOOST IN LIGHT ON SCREEN!** RCA Projector is first *designed* for use with new 1200-watt lamp. Higher-power blower rotor moves more air to keep aperture and mechanism cooler, assuring complete film safety. Optional two-bladed shutter adds another 40% light on screen for brightest picture ever.

FEATURING **great new WEAR-RESISTANT CASE!** Surf-green fabric case takes more scuffing and abrasion and shows it less than any standard case in use today. It's twice as resistant to ordinary wear.

Remember these great new RCA "LIFE-TESTED" features. With them, you'll all but forget maintenance for your projectors. And of course RCA Projectors *still* thread easiest of any 16mm machine. In fact, their distinctive new surf-green finish makes for even simpler threading and operating in darkened rooms. The same superlatively clear, RCA-engineered sound is yours, too.

See and hear how far ahead of the field you'll be with the great new "LIFE-TESTED" line of RCA 16mm Projectors. Ask your RCA Audio-Visual Dealer about the powerful two-case RCA Senior, the compact RCA Junior. Their "LIFE-TESTED" features can be *yours* today!

*Rigid endurance standards have been set for RCA "LIFE-TESTED" Projectors. Individual components as well as finished projectors are subjected to continuous testing to evaluate the durability and efficiency of all operating parts. "LIFE-TESTED" at RCA means better, more reliable performance from RCA projectors.

RCA Tmk(s) ®

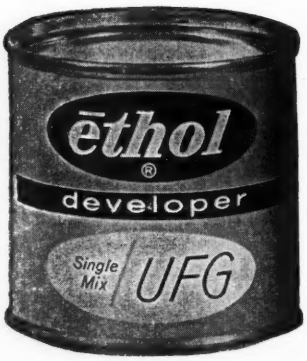
RADIO CORPORATION of AMERICA

AUDIO-VISUAL PRODUCTS

CAMDEN 2, N.J.

. . . for more details circle 569, page 65

Fine Grain in Five Minutes



Imagine a developer that can produce ultra fine grain negatives with emulsion speed increased instead of slowed. At 70°, Ethol UFG does it in *five* minutes instead of 20 . . . And you get *normal* density and contrast instead of thin, flat negatives . . . *better* gradation . . . *lower* fog level . . . *faster* film speeds without appreciable increase in grain . . . Ethol UFG has longer life than any other fine grain developer and works well with all kinds of film. Replenisher available.

Isn't this exactly the developer you have been looking for, just what you need for all sizes of film?

Available in quart, gallon, 3½ gallon, 5-gallon and 48 gallon sizes to meet every amateur and professional need.

Have your dealer order Ethol UFG

PLYMOUTH
PRODUCTS COMPANY, INC.

1770 WEST BERTEAU AVENUE

CHICAGO 13, ILLINOIS

. . . for more details circle 610, page 65

New Equipment and Materials

Keep posted on the latest developments in the photographic field. Each new product and supply item featured below has a key number. If you want more information on the subject — without any obligation — circle that same number on the Readers Inquiry Card on Page 65.

Makro-Kilar Lenses 101

Kling Photo Corporation has released data on two new models of the Kilfitt Makro-Kilar lenses for 35mm and 16mm and 35mm movie cameras. The two models are designated Model E and Model D, both of which are four-element with good resolving power and color correction with a wide focusing range. The Model E is an *f*/2.8 with a range from infinity to 4″ and a reproduction scale of 1:2. The Model D ranges from infinity to 2″ and a maximum reproduction scale of 1:1.1. On the 35mm camera the angle of view of both lenses is 54 degrees and both of the lenses will take standard series V filters. Price, Model E, $119.95; Model D, $139.50.

Color Printer 102

A 16mm reversal-additive printer with scene-to-scene color correction and control is now being marketed by the *Southwest Film Laboratory*. Designed during a three-year research period, the printer is controlled electronically by a punched tape system. The trade name of the new model is Triad Color Control Printer.

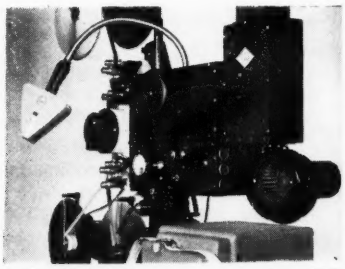
Step and Repeat Camera 103

To speed multiplicity printing for photo-engraving and shorten make-ready time the *Natural Lighting Corp.* has developed a special 70mm camera which transports the film step by step to match the opening setup at the film gate, allowing accurate images to be made with precise spacing. To vary image size a turret with four 7″ and 10″ lenses is provided.

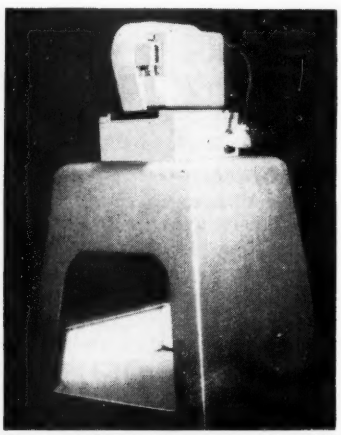
Underwater Blimp 104

Birns & Sawyer has introduced a water-tight housing called the Aquarri for the Arriflex 16 camera. The housing was designed by Birns

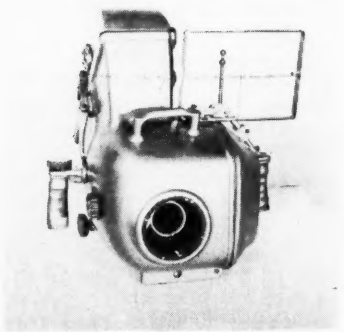
Makro-Kilar Lenses See 101



Color Printer See 102

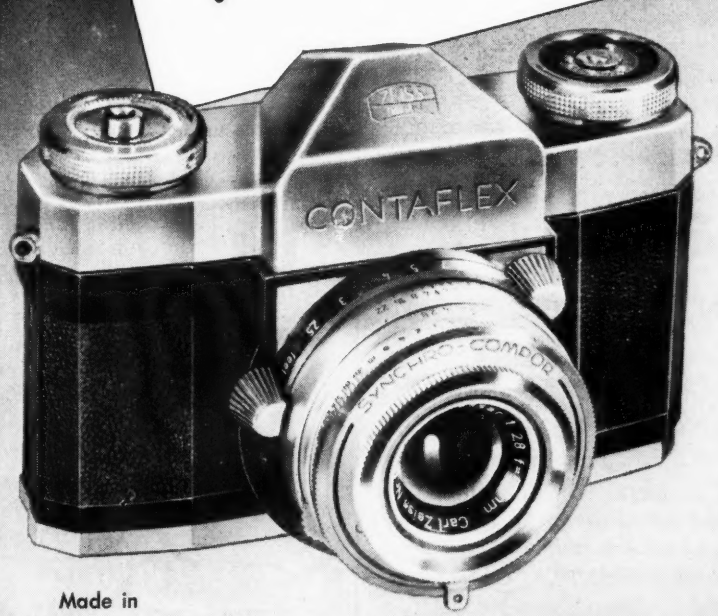


Step and Repeat Camera See 103



Underwater Blimp See 104

Happy Picture taking!



Thousands of people who already own a camera will be delighted to find a *Contaflex* among their gifts.

This unique 35mm single-lens reflex brings *new pleasure* and *finer results* to the photographer. It is so fast and simple in operation that even a beginner can master it. While focusing, you have a big, brilliant view of your subject. The through-the-lens focusing system, with combined ground-glass and split-image rangefinder, makes it easy to get super-sharp negatives all the time.

Its Zeiss Tessar f/2.8 lens can cope with practically any light conditions, and its Synchro Compur MXV shutter has speeds to 1/500 sec.

In four models from $153. Models III and IV permit the use of quick-change wide-angle and tele component lenses. Models II and IV have built-in photoelectric exposure meter.

At leading dealers. Literature on request.

Carl Zeiss, Inc., 485 Fifth Ave., New York 17

Made in West Germany

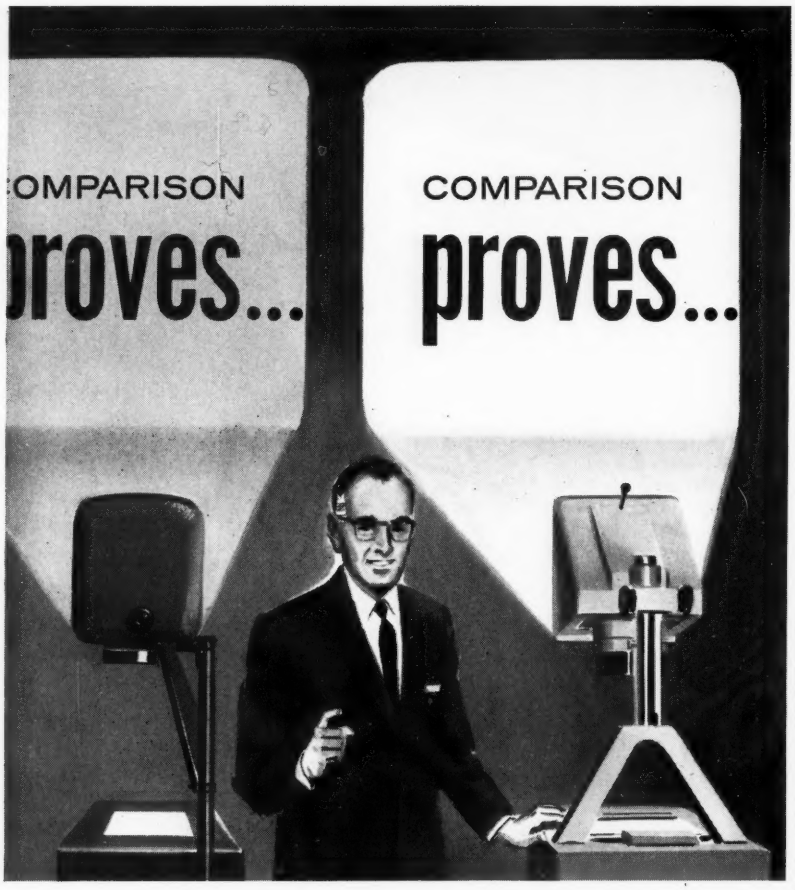
Contaflex

ZEISS IKON

Most popular 35mm single-lens reflex

YOUR GIFT BEARS THIS SYMBOL OF EXCELLENCE

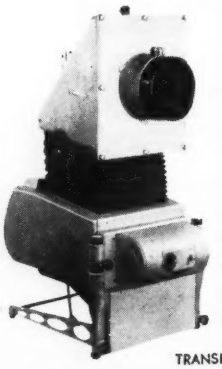
. . . for more details circle 589, page 65



transpaque

PUTS MORE LIGHT ON YOUR SCREEN!

Compare the Transpaque side by side with any other projector on the market. Project the same picture size with each . . . with the same materials, opaque or transparent. You'll find the new Transpaque puts up to *twice the light on the screen* with opaque materials . . . up to *three times* with transparencies.



This means you can use the Transpaque from the front or back of the room, *and even for rear projection*, without putting out lights or drawing shades. Selection of projection lenses from 4″ to 40″ focal length permits you to use *any* screen at *any* distance.

You can purchase the Transpaque complete for opaque, table, or overhead projection. Or, you can purchase this unit for one type of projection now and add equipment for other uses later. See it demonstrated in comparison with others and you'll be convinced that this is truly the aristocrat of visual communication projectors. Write us to arrange a demonstration for you.

TRANSPAQUE OPAQUE PROJECTOR

PROJECTION OPTICS

PROJECTION OPTICS CO., INC. 330 Lyell Ave., Rochester 6, N. Y.

. . . for more details circle 566, page 65

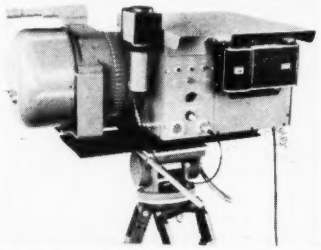
& Sawyer in conjunction with U. S. Navy and Hollywood camermen. It is made of cast aluminum, with balance plates to compensate for buoyancy in either salt or fresh water. Adaptable to the Arriflex 16 battery-driven unit with 500 foot film load, it has been pre-tested to 160-foot depths. FOB price is $1495.

Far Infrared Camera **105**

A new technique of producing thermal photographs has been disclosed by the *Barnes Engineering Company*. Utilizing the Barnes OptiTherm Radiometer system for measuring infrared radiation, a camera records the image by a scanning process where the camera is aimed at the subject and a heat detector picks up the radiation, modulating a light beam in varying degrees of intensity which then transmits the pattern to the standard sheet film. The resultant photograph resembles the image on a TV screen with a series of very closely spaced lines, the dark areas corresponding to the "cold" areas of the subject and the lighter areas of the photo the "hot."

Hi-speed Shutter **106**

Shutter speeds as fast as two millimicroseconds are being reported on the Kerr Cell camera developed by *Electro-Optical Instruments, Inc.* Mounted on a Crown Graphic "45" camera, the shutter is electronically and remotely controlled from a 115V-AC power



Far Infrared Camera **See 105**

Three Film Camera **See 107**

pack. Known as the Model D20, the unit can be delay-timed for the photo study of subjects ranging from impulsive phenomena as they occur in studies of shock tubes, aeroballistic, electrical discharges, and similar applications.

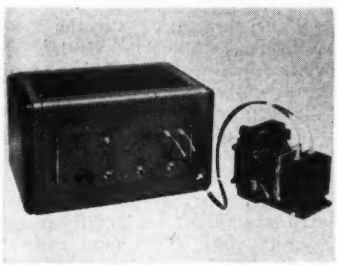
Three-Film Camera **107**

Noble Camera Manufacturing Co. has just revealed additional details on its Model 3-35, 35mm still camera which holds three different types of films. A standard magazine of color and two different types of B&W or any combination thereof may be inserted into the camera, eliminating the need for carrying extra cameras or magazines. Another feature of the Multi-film camera is that it has an interchangeable lens turret with four lenses available. With the standard equipment a Schneider 50mm f:2 lens is included. Shutter is a Compur MX, full sync., with 1 second to 1/500 speeds. The price of the standard model is $299.50, one lens included.

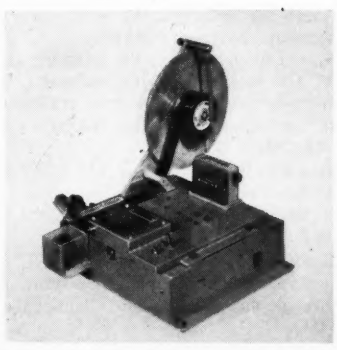
35mm Film Cutter **108**

A motor-driven 35mm film cutter, operative both continuously or intermittently, has been produced by the *H. L. Instrument Co.* It is reported to cut 110 pieces of film per minute with three frames being visible in an illuminated panel as the cutter operates. Suitable for all slide mounting opera-

continued on page 40



Hi-speed Shutter See 106



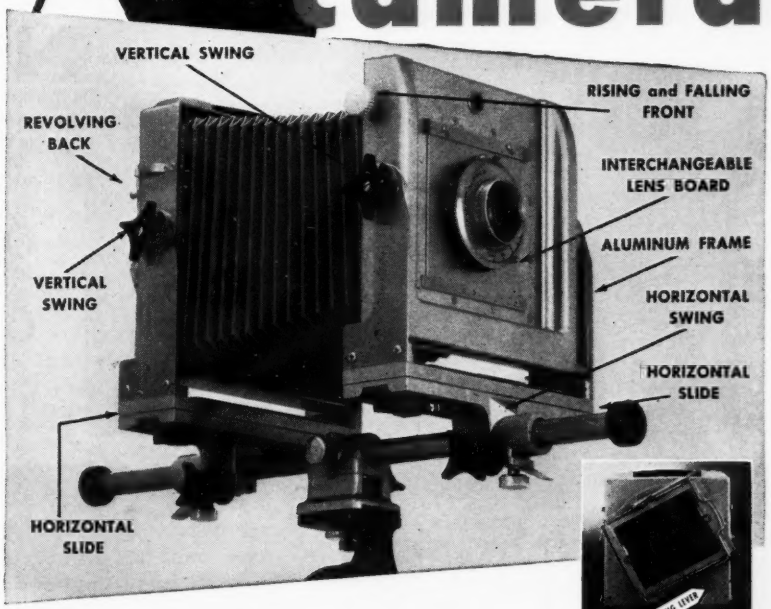
35mm Film Cutter See 108

swing it...shoot it...sell it!

...your customer BUYS what this camera sells!

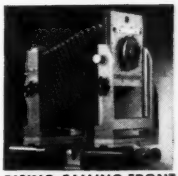
the remarkable calumet

4x5 view camera



REVOLVING BACK
complete circle

VERTICAL SWINGS
30 degrees



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. . . for more details circle 507, page 65

This one feature *alone* puts the new NIKON SP years ahead of any other '35' in the field

the Nikon SP Universal Viewfinder System

BUILT-IN VIEWING FIELDS FOR 6 FOCAL LENGTH LENSES
28, 35, 50, 85, 105 and 135mm — without any accessories

AUTOMATIC PARALLAX COMPENSATION
for "normal" and telephoto lenses: 50, 85, 105 and 135mm

LIFE-SIZE, ONE-TO-ONE VIEWING IMAGE
for "normal" and telephoto lenses: 50, 85, 105 and 135mm

WIDE ANGLE OPTICAL FINDER
for 28mm and 35mm wide angle lenses

6-LENS "PREVIEWER"
pre-selects the lens to use

Without the need for a single accessory finder, the built-in Universal Viewfinder System gives you the viewing fields for the six most-often-used focal lengths in 35mm photography. And it serves not only as a finder, but also as an efficient "previewer" to help you select the right lens to use. You can pick the lens faster; bring it into play faster; and put it to use with greater ease and speed than with any other '35.'

This one feature alone puts the Nikon SP years ahead of any other 35.' But, it is *not* alone, for the SP has many new features which easily make it the most complete, most advanced '35' in the fine camera field – like the new compensating flash-synch control, color-coded for bulb types and shutter speeds – the calibrated self-timer – the improved non-rotating speed dial – the automatic 'O' reset exposure counter and load indicator – and many others.

But above and beyond all features is the handling ease and speed of the SP. The single stroke film transport, the focusing wheel and body release in Nikon's traditional "advance-focus-shoot" grouping gives the Nikon owner an extra edge in every picture situation.

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. . . for more details circle 561, page 65

Industrial Photography

VOL. 6, NO. 12 DECEMBER, 1957

EDITORIAL

"PASS-ALONG" READERSHIP

The manager of a leading industrial photographic department told us recently that he will frequently clip an especially pertinent article from INDUSTRIAL PHOTOGRAPHY and send it on—along with his own memorandum—to an appropriate member of management. Nothing could have pleased us more, for frankly one of the magazine's main objectives is to "carry the ball" for the photo department . . . prodding management towards the recognition of photography's present and potential contribution to the Nation's economy.

In a sense, this article-memo system is a long forward pass which brings both the photographer and the magazine that much closer to a mutual goal. Much progress has been made, and in the little more than five years since our first issue we have seen the company photographic department grow tremendously both in prestige and responsibility.

We like to feel that INDUSTRIAL PHOTOGRAPHY has played an important role in this growth of the industrial photographic craft. But, we are all partners in this objective.

The readership INDUSTRIAL PHOTOGRAPHY gets in divisions served by the photo department is extremely important. It may well be the determining factor in the acceptance of the department as a vital part of the company's overall operation.

Our Reader Inquiry Cards indicate that there is a tremendous amount of "pass-along" circulation among top management. If this pass-along idea comes to you as a new one, may we suggest that you can make the magazine doubly effective by using it to help "sell" yourself to your company.

Jim Watkins

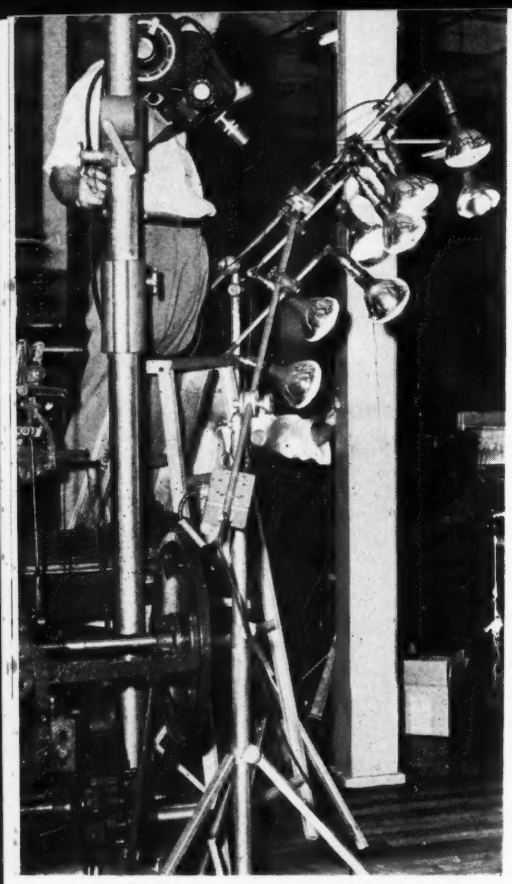
Publisher

COVER PHOTO

Wind tunnel depth in the cover photo was captured with open flash on super pan film by William A. Bowles at the NACA Lewis Supersonic Test Tunnel, Cleveland. Light bounced off stainless steel walls avoided black-out areas. Man in foreground triggered #22 GE flashlamp as men 75 feet downstream fired two more. Two slaves hidden behind men fired simultaneously. There was no light at camera, an 8x10 Deardorff, 10" Ektar lens at *f*/16. Development was for four minutes in Kodak DK-50.

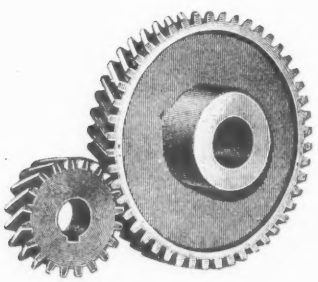
PHOTO CREDITS

Pages 18 and 19, Photo Department, Crompton & Knowles; pages 20 and 21, Ben Rudnick, Superintendent, Photo Reproduction, Republic Aviation; pages 22 and 23, James F. Selvidio; page 24, Merwin Dembling, London, Eng.; pages 26 and 27, Max Hunn; pages 28 and 29, Dick Whittington; page 30, David L. Miller; page 32, Photo Dept., Furnas Electric Co.; page 59, Photo Laboratory, Detroit Edison.



Filming loom operation on location. Note arrangement of banks of lights.

by RALPH A. HUEY
Supervisor, Gen. Engineering
Crompton & Knowles Corp.



High-speed photography OF SPECIALIZED TEXTILE LOOMS

Evaluation of loom components' performances used for engineering research and tool design.

Engineering studies of high-speed machinery require a permanent record that can be viewed repetitively at speeds consistent with the viewer's ability to analyze the mechanism's behavior. For this reason, the Textile Machinery Division of Crompton & Knowles Corp., manufacturer of multiple-shuttle and specialized looms, has for many years used high-speed photography as an important research and design tool.

In the early stages of loom design and development, rules of thumb resulting from past experience were used as guides for determining data on operation phases such as linear and rotative displacement and the time interval of any mechanism cycle or portion thereof. Numerous attempts were made to check these theories by various mechanical and electrical devices—none of which proved satisfactory because of the nature of the loom and the speeds of its mechanisms.

For example, the maximum shuttle velocity of an average width fly-shuttle loom is about 36 feet per second. Transfer of bobbins occurs in the relatively minute time interval of approximately 1/20th of a second. At these speeds, visual observation cannot yield the valid data required to evaluate loom performance accurately.

FIRST VISUAL CHECK

With the availability of compact and mobile commercial high-speed cameras using standard illumination, engineers were for the first time able to check visually the dynamic performance of various loom components. In addition, they had a valuable aid to pinpointing the exact source of any malfunction.

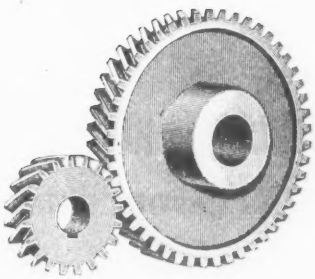
In this respect, one of the major contributions of high-speed photography at our organization has been a performance check on a Crompton & Knowles Narrow Fabric Loom. Standard mechanical testing procedures had failed to reveal the cause of the breakage of the bevel gears which transmitted rotation from the loom's vertical shaft to the upper and lower cam shafts. However, a high-speed cinematographic study of each element of the gear train soon spotted the trouble.

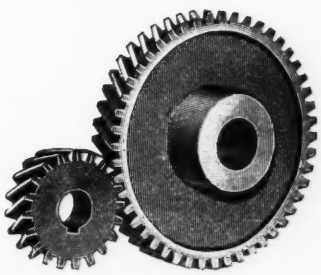
First the cam and cam roll were photographed. An analysis of the film revealed that the cam hesitated in its rotative cycle during periods of maximum harness load.

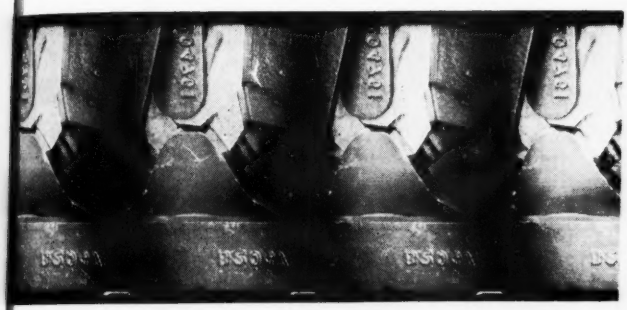
Next, the bevel gear train was photographed at a speed of 1500 fps. The resulting film showed that these gears also stopped during their supposedly constant rotation.

The high-speed analysis of the cam harness motion disclosed that the vertical shaft was being subject to an overload. As a result, unwanted torsion in the shaft was responsible for the interruption of the constant cam and gear rotation.

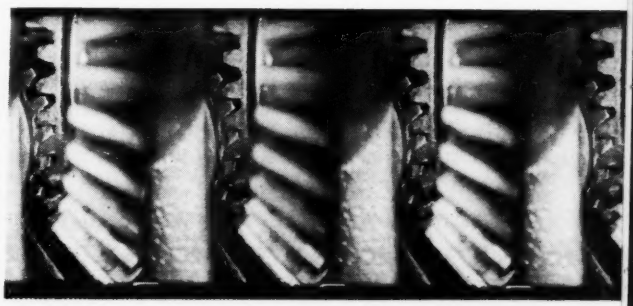
The unit was then redesigned







Sample strip of film showing cam and cam roll action.



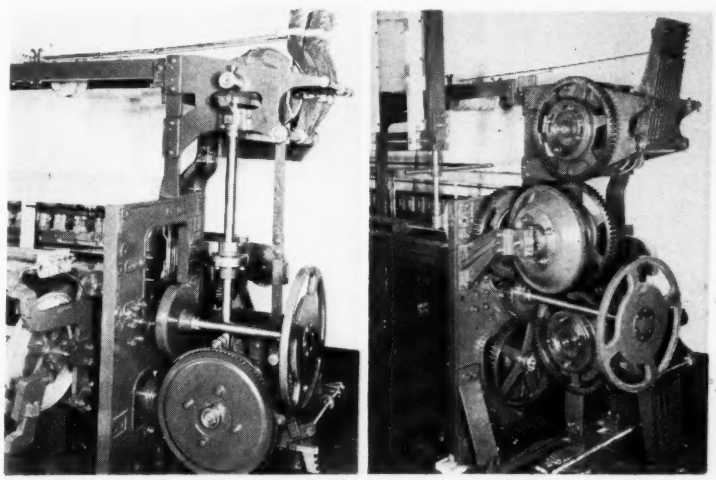
Film of bevel gear train revealed gears hesitating.

and a complete gear train substituted for the vertical shaft and bevel gears. A high-speed evaluation of the new design showed that the gear train no longer hesitated in the rotative cycle.

Solution of problems often more difficult than the example cited above are common occurances at C&K through the practical application of high-speed photography. Our equipment, built around a Type III Eastman Kodak High-Speed camera, is sufficiently mobile to be transported to plants where looms are in operation. In normal situations the standard Kodak Cine Ektar 63mm $f/2.0$ lens is used. If machinery is to be photographed in confined areas, a Kodak Cine Ektar 25mm $f/1.9$ lens is substituted.

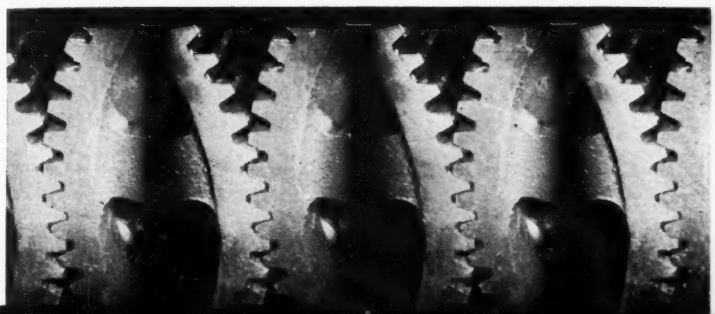
The lighting system, see photo, utilizes eight GE 750R40 bulbs and was designed by the photo staff for either 110-volt or 220-volt operation. In the latter

continued on page 57



Original design of cam harness motion of narrow fabric loom shows vertical shaft (left). At right is the new design showing the new gear train.

High-speed film of new design confirms constant rotation of gear train.



Original drawing is scribed through white masking coat on aluminum sheet to expose luminescent undercoating which is activated in contact printer.

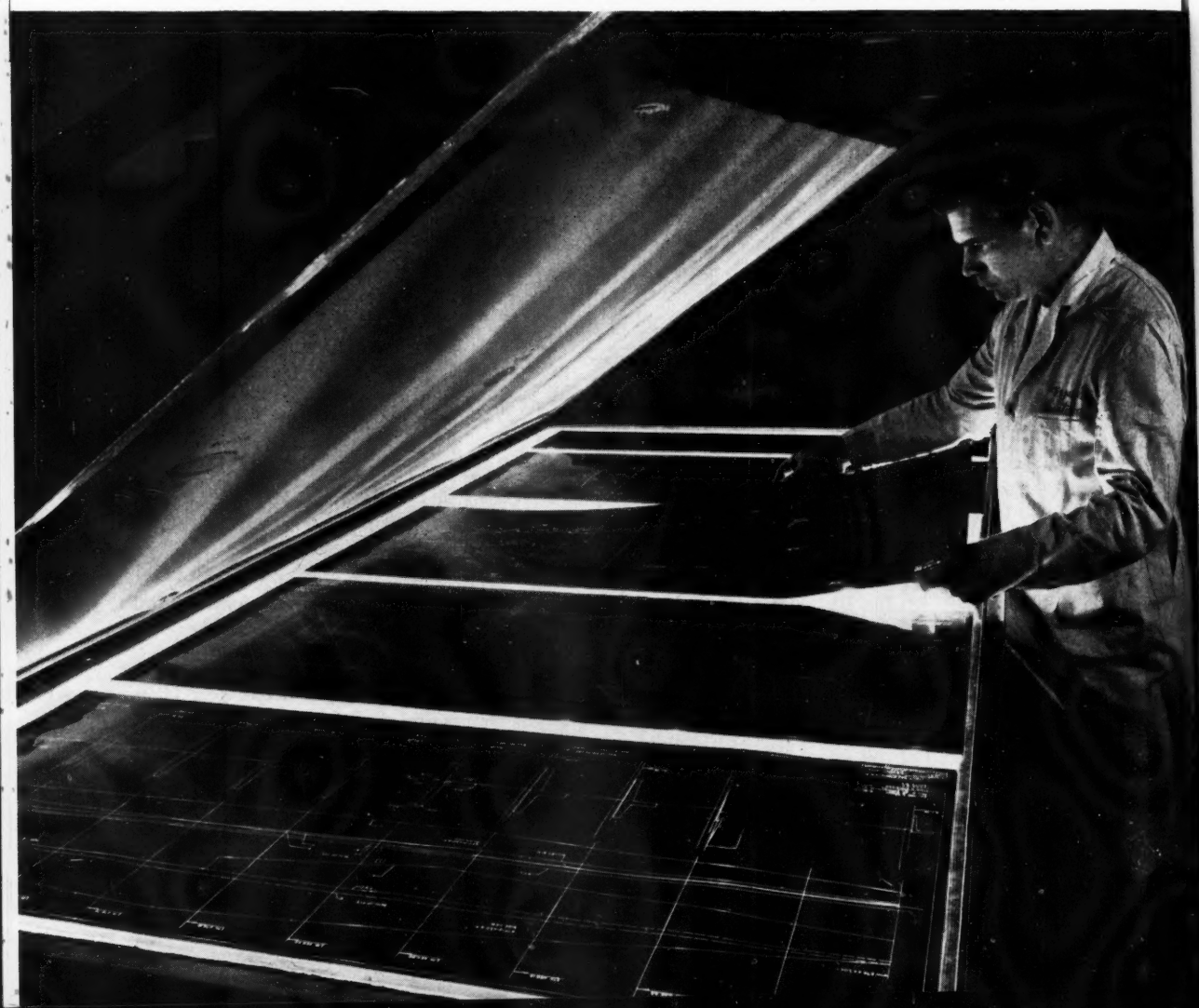
by BEN RUDNICK
Supt. Photographic Reproduction
Republic Aviation Corp.

Drawing-negative SPEEDS LAYOUT PRODUCTION

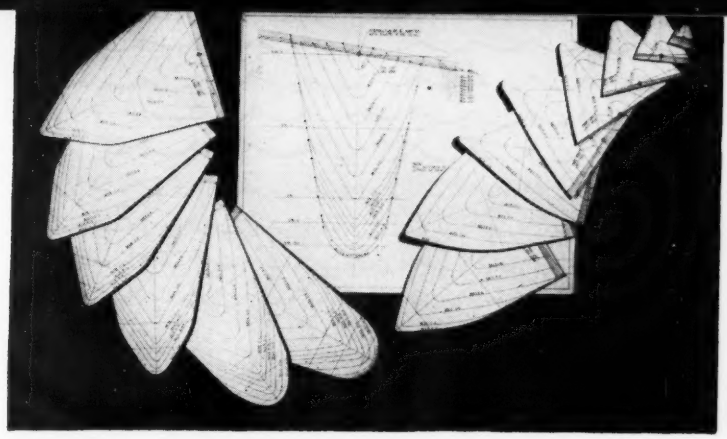
Clockwork production schedules at Republic Aviation Corp. make it imperative that all departments concerned be speedily supplied with accurate copies of master layouts as well as all design changes and drawing revisions. By instituting a contact reproduction system which eliminates the usual intermediate negative step by using the original drawing itself as the negative, Republic has obtained maximum reproduction speed and avoided the possibility of human or mechanical error.

In this "Loftec" process, developed by the writer, original

Plastic sheets, which are used for all drawings under 20x50″, are placed in specially built contact printer.



By using original drawing as negative, layout copies are produced quickly and without error at Republic Aircraft.



Composite layout, center, with individual metal templates printed from it. Original drawings are kept intact. Changes are made by printing original on opaqued sheet, which is then corrected to make new negative.

drafting is scribed onto specially treated Vinylite or aluminum sheets. The only equipment required to reproduce the layout is a darkroom contact printer and developing travs.

Maximum dimensional stability within tooling tolerances is insured by limiting the use of plastic to drawings up to 20″ x 50″. The polished transparent plastic sheets are previously prepared by giving them a series of coatings to produce a white opaque drawing surface on which original layouts may be scribed with a stylus.

TRANSPARENT LINE

Since the result is a transparent line on an opaque surface, the finished drawing becomes a negative which may be reproduced as often as necessary on presensitized steel plates or any other flat sensitized material. When tools are being made, the parts copied in this manner can be cut directly from the steel plate.

Original masters are kept intact at all times. When design changes or revisions are to be made, the drawing is first reproduced onto a sensitized sheet of opaqued plastic. After the image has been developed, the revision is drafted on the opaque surface and the corrected drawing scribed onto the sheet which then becomes a negative for reproducing copies of the revised layout.

By means of masking, any portion of the original drawing can be reproduced without waste of sensitized material. A quick check on a mold line can be made by reproducing the desired portion of a master layout on a piece of sensitized clear plastic.

SETTLE ON ALUMINUM

The required dimensional stability of master negative-layouts larger than 20″ x 50″ prohibits the use of plastic as the original drawing surface. Republic, therefore, experimented with various types of possible layout materials before settling on aluminum. Plate glass, for example, was tried and rejected because of possible breakage and the subsequent destruction of a time-consuming hand-drawn layout. In addition, there were problems of handling and cost to be considered which made glass impractical.

Though aluminum's co-efficient of expansion is negligible and its cost not prohibitive, the problem of converting a non-transparent material into a negative remained. The solution hit upon was to apply the light source directly to the aluminum surface in the form of a luminescent coating.

Accordingly, the aluminum layout sheets are spray-coated with calcium strontium sulfide pigment suspended in a suitable vehicle. A white masking coat is then applied over this luminescent.

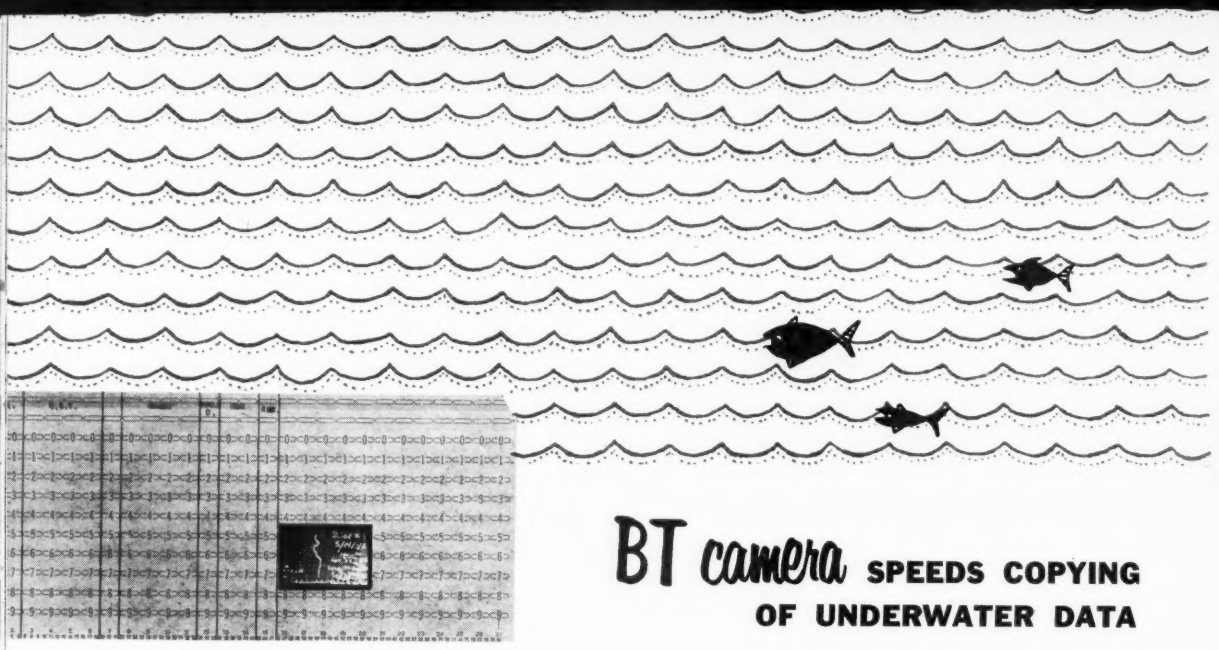
Procedure for making master layouts on aluminum is similar to the one used with opaqued plastic sheets. Scribing through the masking coat with a stylus exposes the luminescent underneath. The latter can be sufficiently activated in the contact printer to transfer the image to sensitized steel plates of varying thickness.

The 6½′ x 10½′ vacuum contact printer used to expose the sensitized metal plates from either translucent plastic or luminescent aluminum "negatives" was especially made at Republic. It contains 190 40-watt incandescent bulbs. Exposure from a plastic negative to a sensitized steel plate is one-half second, exposure from luminescent aluminum 75 seconds. The plates are developed for 45 seconds in a metal-hydroquinone developer modified to inhibit oxidation.

STOCK STANDARD SIZES

Photographic emulsions used are prepared at Republic. To speed the darkroom operation a supply of presensitized material, in 128 standard sizes is stocked at all times. This system has proven itself in operation.

More than 50,000 square feet of reproduction work is turned out by the Graphic Arts and Reproduction Department each month. In this operation, the "Loftec" system of contact reproduction of full-scale drawings has proved itself not only by eliminating the possibility of reproduction errors but by saving thousands of manhours yearly, both in the Drafting Department and the Reproduction Department. □



BT camera SPEEDS COPYING OF UNDERWATER DATA

Specially designed unit facilitates Navy Sound Lab's copying of depth-temperature records required to be sent to Hydrographic Office.

A long-standing bottleneck in the work of the Photo-Optical Techniques Branch of the Navy Underwater Sound Laboratory in New London, Connecticut, has been broken by a specially designed 35mm camera unit which quickly and simply copies bathythermographic information needed for research at the Lab.

This information is obtained by a bathythermograph, an ocean-going thermometer which is lowered into the water to record the temperature of the ocean as it varies with depth at a particular place. The record, called a bathythermogram, consists of a fine line scribed on a small smoked-glass slide. This "BT slide," after being marked and lacquer-coated, is placed against a calibrated grid to show temperature as a function of depth.

MUST COPY SLIDES

It is required that all BT slides taken by the Navy be sent to the Hydrographic Office as soon as possible. However, this BT information is also necessary to the work of the Underwater Sound Laboratory and copies of the slide must be made prior to release of the originals.

by JAMES F. SELVIDIO
Head, Photo-Optical Techniques
U. S. Navy Underwater Sound Lab.

Before development of the BT camera, the print room technician in the Photo-Optical Techniques Branch had to separate all the BT slides, which are 1 x 1¾ inches in size, so they could be paired with the appropriate grid (shallow, normal or deep), insert each slide in its grid, place the grid in the enlarger and after exposure remove and separate the grid and slide. The entire operation had to be repeated for each slide.

This phase of the work was time-consuming and tedious and had to be done with caution since all the parts are delicate and breakable. It often monopolized darkroom facilities for several days, holding up other work.

Although at one time an attempt was made to process the BT slide copies aboard ship, rough seas and adverse weather conditions made it difficult and sometimes impossible to work with solutions and the effort was discontinued.

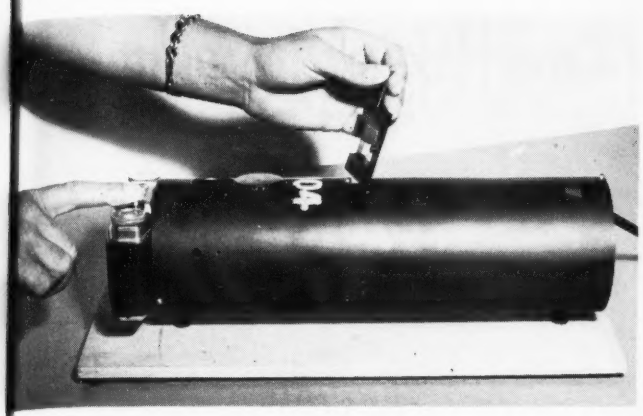
With the BT camera, which was designed by the author, each BT slide and its appropriate grid are recorded photographically directly on 35mm film. The photography is usually done at the end of each day's operation and requires only 15 to 30 minutes to copy all BT slides taken on that day.

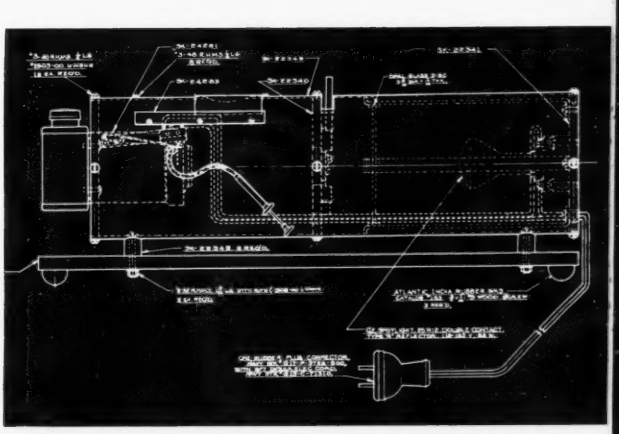
The unit utilizes an Ansco Memar camera, which advances the film and cocks the shutter in one operation and thus eliminates the possibility of double exposure. An extension tube is used to extend the lens' focal length in order to focus on the BT slide and grid at the proper distance to fill the 35mm frame.

FITTED INTO TUBE

A piece of flashed opal glass is placed approximately seven inches from the lens as diffusion for the light source, a low-power (5 watt-second) electronic flash unit. The flash is synchronized with the camera shutter.

The entire assembly is fitted into a 5-inch-diameter tube which is mounted horizontally on a base board. A slot in the top of the tube permits insertion of the BT slide between the camera lens and the opal glass disk for photography. The whole unit is 16 inches long, 5½ inches high and five inches wide. It weighs





Exterior view of bathythermographic camera shows operator inserting "BT slide" and calibrated grid into tube to be photographed. Drawing at right(of earlier model) shows position of camera and electronic flash unit.

approximately eight pounds.

This current model of the BT camera replaces an earlier model which was modified to avoid occasional double exposures. The earlier model utilized a 35mm Kodak camera. The lens was a 50mm *f*/3.5 in a self-cocking shutter with a speed of T., B., 1/30 of a second.

Illumination was provided by a General Electric 25-watt spotlight, a lamp only 1½ inches long and ¾ inches wide.

RECORDING IS SIMPLE

A normally "off" switch was placed directly over and in contact with the external shutter arm. When the cable release was depressed, it immediately caused the shutter arm to move away from a microswitch which opened the circuit, turned on the lamp and fired the shutter. When released, the shutter arm returned to its original position against the microswitch to shut off the lamp.

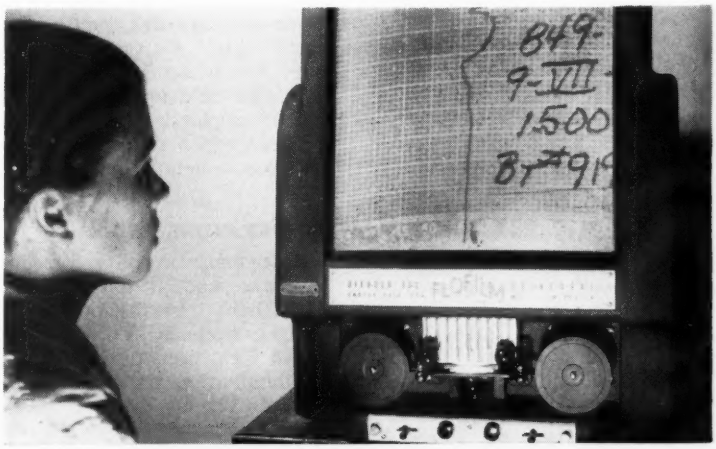
Recording of the slides with the BT camera is quick and simple. Each slide is inserted into its grid, which is in turn inserted into the tube through the slot in the top. After exposure the slide is withdrawn and the film advanced to record the next slide.

Films can be developed aboard ship in a daylight-loading tank if desired, but usually they are returned to the Laboratory for developing in the normal manner. If the volume is large, the films are stapled together and run through the Lab's Houston Fearless motion picture processing machine.

The developed films may be placed in the Diebold microfilm reader for direct, visual procurement of data. To make prints from successive frames, it is a quick and simple matter to run the 35mm film through the enlarger.

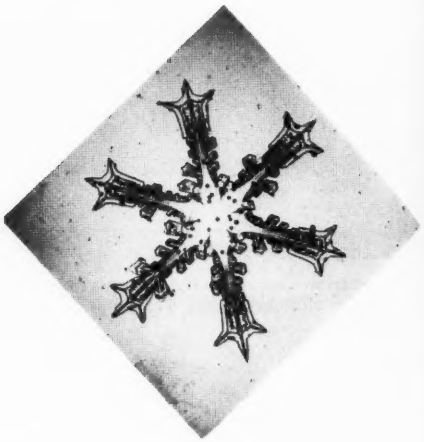
After the required number of prints have been made, the film roll is placed in a Filmsort mounter. An IBM card is then placed in the slot, a film-cutting lever is pressed, and in one operation the film is cut out of the roll and inserted into the IBM card. This IBM card is then coded and filed for future reference.

Thus the BT camera saves time in making possible the daily recording of slides while at sea regardless of weather conditions and in eliminating the buildup of a large volume of slides and a subsequent bottleneck in the print room. And it provides the Laboratory with a negative for a simple, direct and permanent means of reproduction. □



After film roll of a set of slides has been developed, it may be viewed on microfilm reader, as above, or cut into IBM cards and placed in file.

Snowflake photography



Making plastic casts of snowflakes permits photographer to handle subject for long periods inside lab without fear of melting or distortion.

by MERWIN DEMBLING

Photographing a subject half a millimeter in diameter is a tricky job at best. It gets even trickier when the subject is so sensitive to temperatures that variation of a few degrees either way might melt it altogether or change its form so completely as to make it unrecognizable.

This tiny prima-donna is no mysterious substance found only in well endowed laboratories. It's just an ordinary snowflake.

Dr. B. J. Mason, Head of the Cloud Physics Research Laboratory of the Department of Meteorology, at London's Imperial College, is probably the leading snowflake photographer operating today, but he is by no means the first. W. A. Bentley, an American amateur, published an exhaustive atlas of snowflake forms back in 1931. More recently the Japanese meteorologist Ukichiro Nakaya published a brilliantly illustrated volume on snowflakes.

Both Bentley and Nakaya had to make their snowflake pictures with frost-numbed fingers, outdoors. The man who brought the snowflake into the studio was a General Electric researcher, Dr. V. J. Schaefer. In the course of his work on aircraft de-icers, Schaefer evolved a technique for making plastic casts of snowflakes. For most research and photographic purposes, these casts are as good as the snowflakes themselves, and a lot easier to handle.

In the Schaefer process a microscope slide is dipped into a one per cent solution of Formvar in ethylene chloride for about half a minute, at a temperature of —5° C. Coated with the plastic resin, the slide is held horizontally under a snowfall. The captured flake sinks to the bottom of the plastic film, and the slide is kept at a temperature below freezing until the ethylene chloride evaporates, leaving it—the snowflake—caught in a thin plastic skin. At room temperature the water in the melted snowflake evaporates through the porous plastic, leaving a perfect cast which retains even the microscopic details of the original.

TEMPERATURE-PROOF

These temperature-proof replicas have made it possible for researchers to experiment with lighting methods. Formerly reflected light was the only kind of illumination that could conveniently be used. Now, however, snowflakes — or replicas — can be photographically recorded by reflected, transmitted, or oblique light. Each one has its uses: transmitted light gives the best outline and structural results, reflected light reveals surface features best, and oblique lighting gives the best modelling.

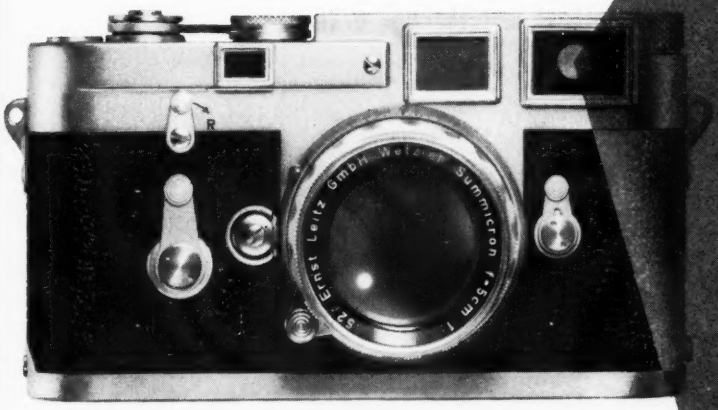
Photographs point up similarity between pictures of replica and the real thing. At upper left is reflected-light image of replica. Compare it to view of real flake made by transmitted light (above).

A variety of equipment is used; Mason maintains that he is not a photographer, and his pictures are made as only a small part of his laboratory's research. For this reason they are more apt to use standard aids to photomicrography than spend time figuring out just the right gadget for their needs. Basic tool is a quarter-plate (3¼ x 4¼) camera attachment for the lab's Beck microscope. The large film size is used for ease in handling individual negatives.

Since the laboratory is located on a broad and busy London street, vibration is a problem, particularly with two-second exposures by ordinary microscope illumination. This has been solved by using flash. □

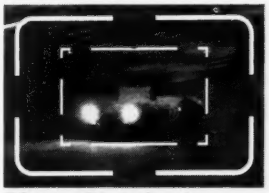
Leica M-3

ONE FINDER, AUTOMATIC FOR FOUR FOCAL LENGTHS...

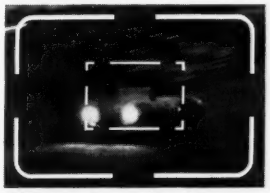


35mm—This field appears when the Leica wide-angle lens, the RF Summaron f/3.5, is attached.

50mm—This is the picture area for standard Leica 50mm lenses, f/1.5, f/2, f/3.5.



90mm—This is the picture area for Leica 90mm lenses.



135mm—This is the picture area for Leica 135mm lenses.

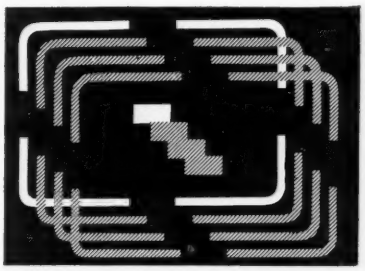
...WITH AUTOMATIC PARALLAX COMPENSATION!

Every camera enthusiast knows the big feature of the LEICA M-3: the life-size, ranging-vision viewfinder with its automatic changing of bright-line frames. But did you know that this ingenious finder also compensates for parallax* automatically?

With any of the superb bayonet-mount Leica lenses, the LEICA M-3 gives you the correctly outlined image on film—at any distance. And now, by simply inserting the new Leica RF Summaron 35mm lens, you have the same ranging-vision finder for wide-angle viewing. Even in dim light, as in the nighttime racing scene above, the M-3 gives you a brilliant view, with an extra-bright ranging field in the center of the viewfinder for rapid and accurate focusing, and an outlining frame as bright as if it were lit up.

You can "preview" the picture, too. By simply pressing the Frame Selector lever, you can decide whether to use the 50mm, 90mm or 135mm lens, without actually changing lenses.

Remember, this unique viewfinder is only one of the many exclusive features of the very advanced LEICA M-3—a camera designed for the contemporary photographer but crafted with the precision and durability that is synonymous with the LEICA tradition.



*Viewfinder frames move continuously to compensate for parallax at any distance from the subject.

For special LEICA M-3 brochure write Dept. 206

Leica

E. LEITZ, INC., 468 FOURTH AVENUE, NEW YORK 16, N.Y.
Distributors of the world-famous products of Ernst Leitz G. m. b. H., Wetzlar, Germany—Ernst Leitz Canada Ltd.
LENSES • CAMERAS • MICROSCOPES • BINOCULARS

20657

. . . for more details circle 550, page 65

by MAX HUNN

Photography & Florida's Turnpike

Authorities keep the public informed of road's progress by supplying newspapers with widespread photographic coverage.

Photography has been an effective tool in solving the problem of public acceptance connected with the recently opened $62,000,000 108-mile Fort Pierce-Miami section of the projected 388-mile Florida Turnpike.

The idea of the Florida tollway has been debated vigorously and actual construction was started in July 1955, against a background of heated argument and opposition. It was decided at the outset that it was vital to keep the public advised of the progress on the Turnpike. This policy decision resulted in the Turnpike's Director of Advertising, Allan E. Hinton, utilizing photography to the maximum in the publicity, advertising and public relations programs.

The Turnpike sent out its first picture on August 1, 1955, and in the following 21 months released approximately 20,000 8x10 black and white glossies with complete captions. Pictures were sent regularly to all Florida newspapers and to key northern newspapers in such cities as New York, Washington, Cleveland, Boston, and Chicago.

GENEROUS SUPPLY GIVEN

In addition pictures were provided to any accredited freelance or magazine writer or to any publication requesting. Incidentally, in supplying such requests, the Turnpike people were not niggardly.

"We often gave as many as 24 pictures to an individual writer and as many as 40 prints to one company or magazine when requested," reports Hinton. "We believe that it is worthwhile to provide plenty of pictures. If you provide one picture, you'll get only one published. If you provide several, you've an excellent chance of the editor deciding to make a layout."

For the opening of the Turnpike earlier this year, 1200 pictures were prepared and placed in special press kits for newspapers, magazines and others covering the special ceremonies. In addition, on-the-spot photographic coverage was supplied on request.

The Turnpike people didn't

overlook Florida's numerous weekly newspapers which lacked their own engraving facilities. Hinton prepared special layouts of four to six pictures, ordered engravings and distributed 225 captioned mats to these publications.

Stock pictures and mats of key personnel who might figure in the news were supplied all Florida newspapers in advance for use at the editors' discretion.

Pictures of all types were used. When one contractor hired Seminole Indian women to seed and spread hay over the new shoulders of the highway, human interest pictures were taken and received widespread publication.

GROUND, AERIAL SHOTS

Progress photos, both ground and aerial were widely distributed and published. Turnpike people found that 20 to 25 per cent of the published progress photos were aerials, which lent themselves to showing graphically sprawling interchanges often covering several miles.

The majority of the still pictures were taken by A. Wade Blake, director of photography for the Florida State Highway Department, who was assigned to the Turnpike Authority on loan at frequent intervals. He took both the ground and aerial pictures using 4x5 Crown Graphics and a Fairchild K-20, 4x5-roll film camera respectively.

Films were processed and prints made in Blake's Bartow, Fla., laboratory. Customary orders ran to ten 8x10-inch prints of all negatives, and the average assignment consisted of 36 4x5-inch negatives. All prints are made with an Omega D-II enlarger, equipped with cold light, on Ansco Cykora No. 2 paper.

In addition to still photography, Hinton made wide-spread use of movies. Blake, who doubles in brass as a cinematographer, shot more than 5,000 feet of 16mm regular daylight Kodachrome using an Eastman Cine Special Kodak. Hinton, aided by an outside movie technician, handles the editing and

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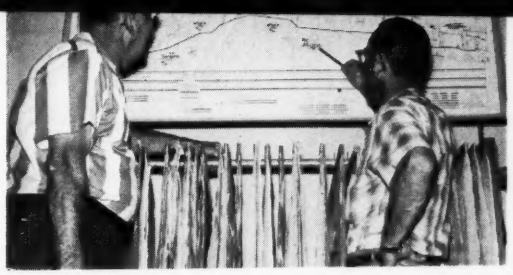
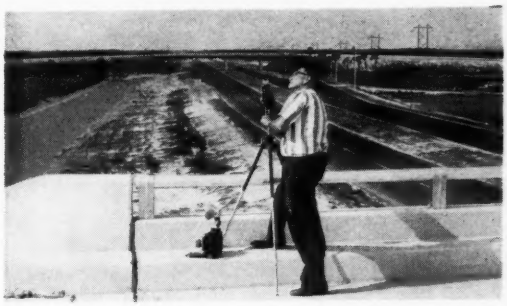


Allan Hinton (right) points to particular area on map while briefing A. Wade Blake on assignment.



Blake checks his light before filming a 16mm color movie sequence. Still camera is also ready for use.

Hinton and Wade discuss set of photos with Thomas B. Manuel, Florida Turnpike Authority chairman.

Hinton crops pictures while preparing layout for a mat release to weekly newspapers in the state.

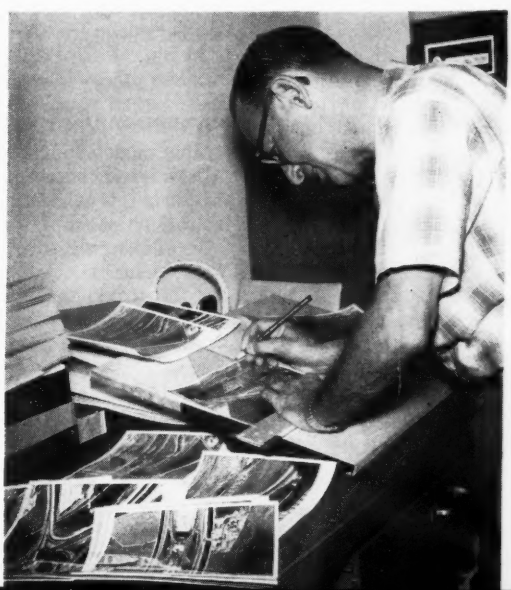


Photo-drawings of scale models

SPEED DRAFTSMAN'S JOB

Engineering models of chemical plants and refineries photographed to save drawing time.

by T. S. TUCKER
Design Supervisor
The Fluor Corp., Ltd.

Several years ago we thought of replacing the usual orthographic piping drawings with some type of photographic reproduction. Since we were building detailed scale models of refineries and chemical plants at Fluor, why couldn't we copy them photographically and use the reproduction as a drawing background.

As there are just not enough piping draftsmen to go around, this method would relieve them of the time-consuming task of drawing background detail. Their time could be spent calculating dimensions and making those detailed drawings that can't be photographed.

To develop a successful method of making photographic drawings of engineering models, we had to meet the following conditions: economical photo drawings, a film with the characteristics of paper, photogenic models, a photographic technique to be developed by Fluor personnel, standardized size and style, educating our office and field personnel in the use of photographic drawings.

Here is how we did it!

By experiment we soon proved that acceptable prints could be made from a film positive on a diazo-type machine for about 6c a square foot. Quality of the prints is determined by two things: the contrast of the film positive and the type of printing paper. A good positive will produce sharp prints using standard "blue-line" paper, while poorer positives should be printed on "black-line" plastic coated paper.

Since additional information often had to be drafted onto the film positive, it was decided to use a material with a matte surface, which would take pencil readily. Better results could be obtained with other film stocks, but the requirement of working on these positives with ink or grease pencil ruled them out.

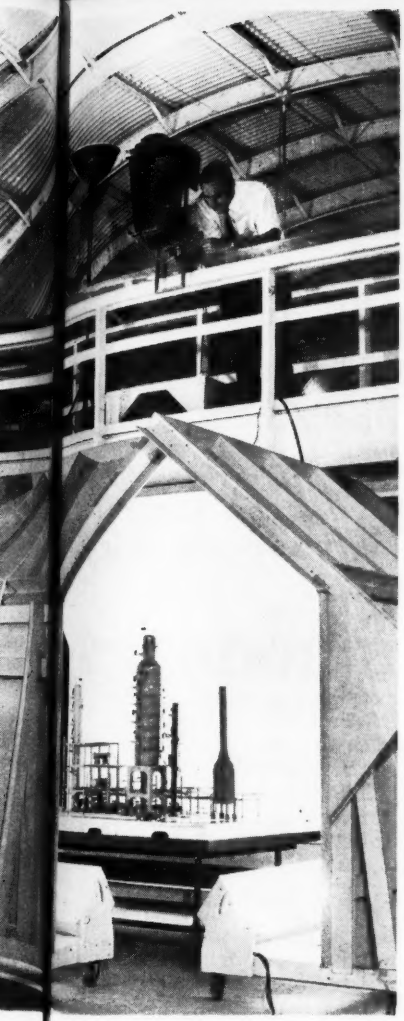
Testing matte films showed that Eastman Kodalith Ortho Thin Base Film was our best bet as it is thin enough to allow printing in our Ozalid machine without fuzzing because of light diffusion through the film base. Besides withstanding much handling with only minor breakage on the edges, Kodaliths take pencil easily, erase cleanly, and the photo image can be removed easily with standard drafting room eradicators. As it is available in roll stock, there is no problem of cut film sizes.

MAXIMUM AMOUNT

The model itself should contain the maximum amount of information that can be included in the photograph to eliminate later additions by the draftsman. This includes a method of line identification that will reproduce. Of the several schemes tried, the most successful involved white plastic snap-on tags that can be easily lettered. These tags also show the direction of line flow. We also developed a method for attaching equipment numbers and names, as well as coordinate information, on the model.

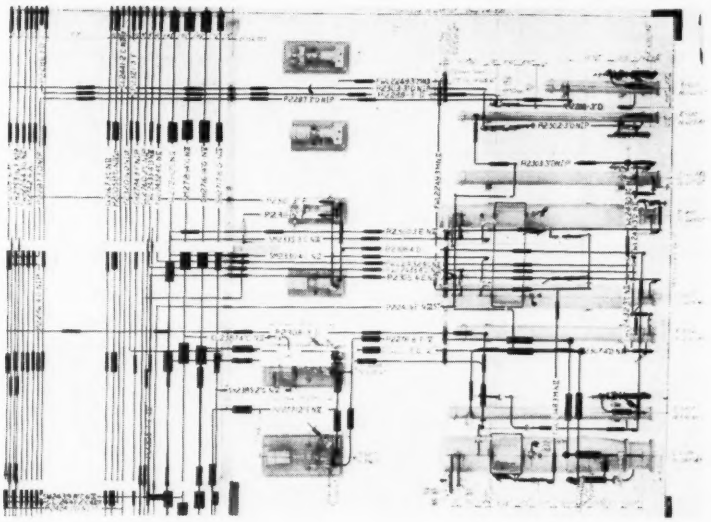
Needed next was a method of making the pipe more prominent in the picture. This was accomplished after experimenting with the types and color of paints used on the model. We selected flat finish lacquers for painting of the model components because they produce no highlights. The colors used for unit identification are now all in pastel shades that produce the required tones of gray. Piping is represented by using colored wire to indicate the center-line of the pipe. Rubber sleeves are added to indicate the true diameter of the pipe runs.

As it is difficult to schedule photography of models when many people are working on, or with, the models, we decided to train several of our key model



Cameraman photographs model from overhead runway set-up in Quonset studio. Model is surrounded by specially-constructed portable reflector units which provide shadowless lighting. Note absence of any overhead lights.

Below is sample Kodalith photo-plan of a small portion of the refinery. Data on model's snap-on tags eliminates extensive drafting additions.



personnel to take the pictures rather than depend on an outside photographer. These people now take very acceptable pictures of the specialized type required.

STUDIO FACILITIES

Next it was necessary to develop adequate studio facilities. A year's experimentation determined what space and equipment were required. Half of a 40x100-foot Quonset building was made available for model photography, crating and storage. An overhead runway was installed with a 24-foot track on one handrail for a camera mount. The camera head used permits controlled movement in all three directions.

Using a 12″ lens with a standard 8x10 commercial camera, we are able to cover isometrically an entire 10x20 foot model. In plan view an 8x10 - foot model may be photographed in a single shot. Or, using a 19″ lens, isometric elevations of similar models may be made, or plan views up to 3x4 feet may be taken.

Shadowless lighting of the models is a serious problem. Tests proved that there should be no overhead light sources if Kodalith reproductions are to be made. Such lighting produces deep shadows, which are objectionable. Instead, we built a battery of adjustable and portable 8-foot long reflector units, each with an independent light source. We placed the units around the model to flood it completely with thoroughly diffused light. With this set-up it's possible to achieve uniform and shadowless lighting.

Royal Pan film is used for making the negatives. Exposures for well lighted models vary from *f*/48 at 1/5 to *f*/200 at 60 seconds. Other models may require a considerable overexposure of

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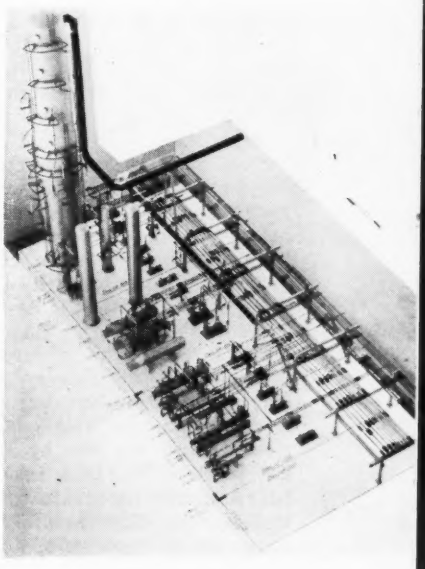
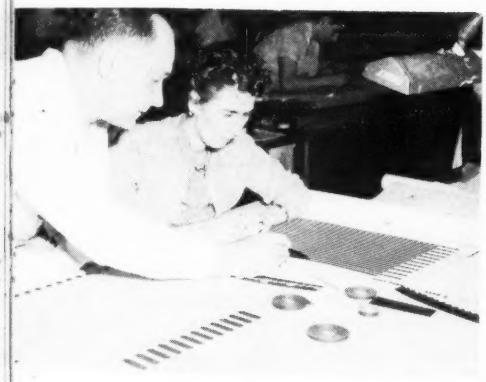


Piping, represented by colored wire, is visible in this typical isometric of part of a refinery.



Engineer checks master "drawing" for last minute changes which can be made by shifting tape strips.

BELL TELEPHONE LABS INITIATE

a new printed circuit technique

Preparation of master layout sheets with movable tape strips instead of by conventional ink methods cuts required production time for wiring boards.

By using self-sticking tape strips engineers at the Bell Telephone Laboratories, Whippany, New Jersey, are speeding up, by 40 percent, the time required to prepare master layout sheets for printed circuits used in their military electronics research and development program.

Printed circuits are used in place of conventional wiring boards because they are easier to produce and are less likely to become damaged since there are no wires, movable parts or coils connected to the wiring board. They are generally prepared from a master layout sheet on which the circuits are drawn.

At Bell, however, instead of drawing the wiring system in ink, terminal circles and connector tape strips, manufactured by the W. H. Brady Company, are used to give the draftsman more maneuverability. The tapes can be easily picked up and moved if a change in the layout is desired. In addition, there's no time lost waiting for the ink to dry.

Since accuracy is very critical, the masters are prepared on dimensionally stable Mylar —treated on one side by Keuffel & Esser to take ink and pencil marks—accurate to five thousandths of an inch. To account for the problem of underetching, the tape is ordered in definite, pre-cut widths a little larger than necessary. To meet their varying requirements, Bell orders in standardized sizes of 25, 50, 75 and 100 thousandth-inch widths, which can be held within .002". The tape has a dull finish, which eliminates the danger of highlights causing hot spots on the negative.

Boards with circuits printed on both sides present a registration problem, especially where holes must be drilled through the board. In these cases two diagrams are laid out on one master—one on each side of the transparent layout sheet. Two kinds of tape must be used. Where identical wiring paths appear on both sides, a straight black tape is used, but for other paths a tape with a white underside is used so there is no chance of lines showing through on the wrong side.

Most masters are laid out on a four-to-one ratio to reduce errors, although for larger circuits two-to-one is sometimes used. A standard Consolidated

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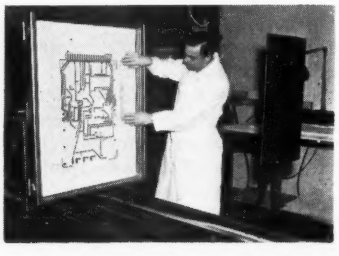


Master is reduced on copy camera

. . . and printed on sensitized board.

Excess copper is etched away . . .

and exposed circuit image is dyed.

2 new products from Heiland

to make Strobonar photography more convenient

Strobonar® 60-S

SLAVE UNIT

Completely eliminates connecting cords in multiple light set-ups...

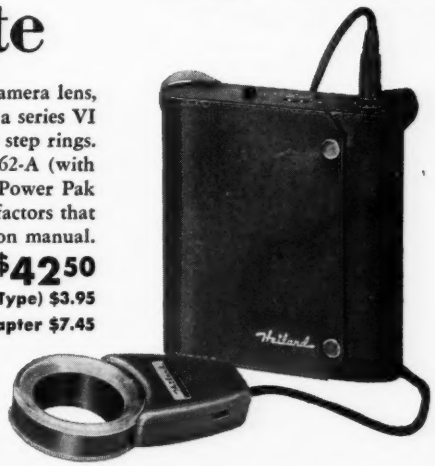
This self-contained electronic flash unit is triggered by the light of the "master" unit at the camera. It is compact, light-weight, and balanced to mount easily on a light stand with either the new Heiland Hold-It (illus.) or Fotoclamp. Carrying handle permits an assistant to hold the unit when use of a light stand is not convenient. The photoelectric cell is protected by a metal directional shield, and both cell and shield can be inserted inside the case for protection when not in use. Powered by one 240v battery that gives an average of 750 flashes. Guide number of 50 with Ektachrome or Anscochrome.

Complete (less battery) $79.50

Hold-It $3.95 **Fotoclamp $9.75**

Prox-O-Lite

TRADE MARK

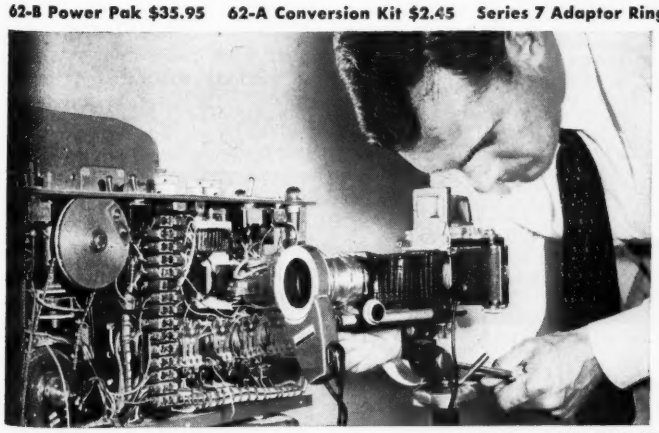


For extreme close-up photography this new Strobonar encircles the camera lens, giving a shadowless light without vignetting. Its mounting flange is threaded for a series VI adapter ring, and may be used with Series V or VII with the proper step rings. The Prox-O-Lite is designed for the Strobonar 62-B Power Pak, for the Strobonar 62-A (with 62-A Conversion Kit), or, if more light is desired, for the Strobonar 71-A Power Pak (with 71-A Adapter). Exposure tables which take into consideration the bellows factors that affect macro-photography are included in the instruction manual.

Prox-O-Lite Lamphead $42.50

62-B Power Pak $35.95 **62-A Conversion Kit $2.45** **Series 7 Adaptor Ring (Amer. Type) $3.95**

71-A Adapter $7.45



See at your photo dealer or write for a free booklet to Heiland Division, Minneapolis-Honeywell, 5200 E. Evans Ave., Denver 22, Colorado.

MINNEAPOLIS **Honeywell**

H HONEYWELL Heiland Division

. . . for more details circle 535, page 65

Company photo files HELP PLAN NEW PLANT CONSTRUCTION

Superimposing 7-year-old negative over camera groundglass, photographer located underground pipe without excavation.

Original photo from company files indicates irregular trench path of underground pipe. To assure clearance for new construction . . .

. . . photographer relocated camera from angles shown in above photo. Right, photo indicates completed structure, clearing water line.

Although the original plant of the Furnas Electric Co., Batavia, Ill., was built some 25 years ago, continued company expansion had called for new additions from time to time. An important factor in facilitating all new building projects is a complete photo file recording all plant construction and including valuable details of foundation and underground pipe installation.

Recently, for example, it became necessary to sink caissons in a new area in order to spot the steel work required for a new plant under consideration. After checking old blueprints, the engineers realized that the area contained many underground water pipes which might interfere with this operation. According to the blueprints, one pipe in particular was in such a position that it might conflict with a portion of one of the projected building's walls. Inasmuch as the trench originally cut for this pipe was rather irregular, it was impossible to determine from the drawings whether or not the drill rig would clear the pipe.

CAMERA RE-POSITIONED

Luckily the company photo files contained a seven-year-old shot taken at the time the original ditch was cut. Using this photo and a unique "re-enactment" technique, engineers were able to plot the proper location for sinking the caissons without danger of hitting the buried pipe.

First a camera was set up in the exact position from which the original picture had been taken. This was made possible by the fact that all construction photos are taken to include some prominent permanent landmark in the foreground. Photo in hand, the photographer was able to find the original camera position by lining up these permanent landmarks.

With the camera's lens wide open and a hood over the groundglass, the negative of the open ditch was super-imposed over the groundglass image. The photographer then had a man starting at various distances from the camera walk at right angles to the original ditch. When this man intersected the ditch image on the groundglass, he was told to drive a stake in at that point.

By this means, the actual line of an underground ditch cut years ago was re-created and caissons sunk. □

4 Kodak Movie Cameras for Industrial Photography

To help you meet your motion picture needs, with due attention to budget restrictions, we describe below some of the fine Kodak Movie Cameras for commercial and industrial photography. Two are designed for professional use, two for personnel outside your photographic department whose needs and photographic know-how may be limited.

★ ★ ★

Precision-built turret camera for professional versatility. The *Cine-Kodak K-100 Turret Camera* gives you the mechanical and optical excellence you need for precise effects. Its three-lens turret accepts Kodak Cine Ektar Lenses, 15 to 152mm, with matching interchangeable telescopic viewfinders. Camera takes 100-foot, 16mm film rolls; provides variable speeds from 16 to 64 frames per second, and single-frame for animation. New-type spring motor pulls 40 feet of film with one winding! Adapts to make fades and dissolves. $445 with *f*/1.4 Ektar. Wide-angle and telephoto lenses with finders are extra.

The ultimate in 16mm motion picture equipment is the justly famous *Cine-Kodak Special II Camera.* A long-time favorite with professional cinematographers, it is highly portable, yet has all the controls needed for fades, dissolves, montages, and other special effects. Here is a camera for the real pro, for the department that makes full-scale industrial movies for training, public relations use, engineering, sales, etc. $1,640 list, with 25mm *f*/1.4 Ektar and 200-foot film chamber.

Versatile, easy-to-use 16mm magazine camera. Designed for the amateur, the Cine-Kodak Royal Magazine Camera is ideal for "quick shots," use by training, engineering, personnel, management and research departments. Loads in 3 seconds with 50-foot film magazines. The "Royal" accepts Kodak Cine Ektar Lenses—15 to 152mm. Provides single-frame, slow-motion and standard filming speeds. Moderately priced at $198 with *f*/1.9 Ektar Lens.

Simple 8mm camera for "note taking," progress reporting, record photography. Practically anyone can operate the rugged *Brownie Movie Camera*, or 3-lens *Brownie Movie Camera, Turret f/1.9*, without experience. Wide-angle, telephoto and standard view, on Turret model, give pictorial control, flexibility. Focus is pre-set. Exposure dial is on the camera. Price only $84.75 for 3-lens Turret Camera, $39.75 for *f*/2.3 single-lens Brownie.

See your dealer for complete details and demonstrations.

Prices are list, include Federal Tax where applicable, and are subject to change without notice.

See back cover of this magazine for discussion of Kodak still cameras for industrial use.

EASTMAN KODAK COMPANY
Rochester 4, N. Y.

Kodak
TRADE MARK

Industrial Workshop

by DAVID B. EISENDRATH, JR., Technical Editor

SOME COMMENTS ON COLOR MATERIALS

This being the end of the year, I took a look back to see just what kind of year it had been for photographers. I am convinced that this was a big year for color and probably the beginning of an era in which we will see rapid advances in present day color material and the introduction of new brands, products, and techniques.

This was the year in which the introduction of fast color opened new vistas in picture making, and certainly stimulated new concepts in color thinking. In many cases it is as easy to make pictures in color as in black and white, and, no longer handicapped by the speed differential, photographers are making many more uses of color materials. Some of these uses were formally dreamed of, but never considered practical until now. Recently I made a survey for Color Corporation of America and gathered some data on color taking materials. If you are interested in extensive information on the subject, write them and ask for their new booklet, "Technical Information on Color."

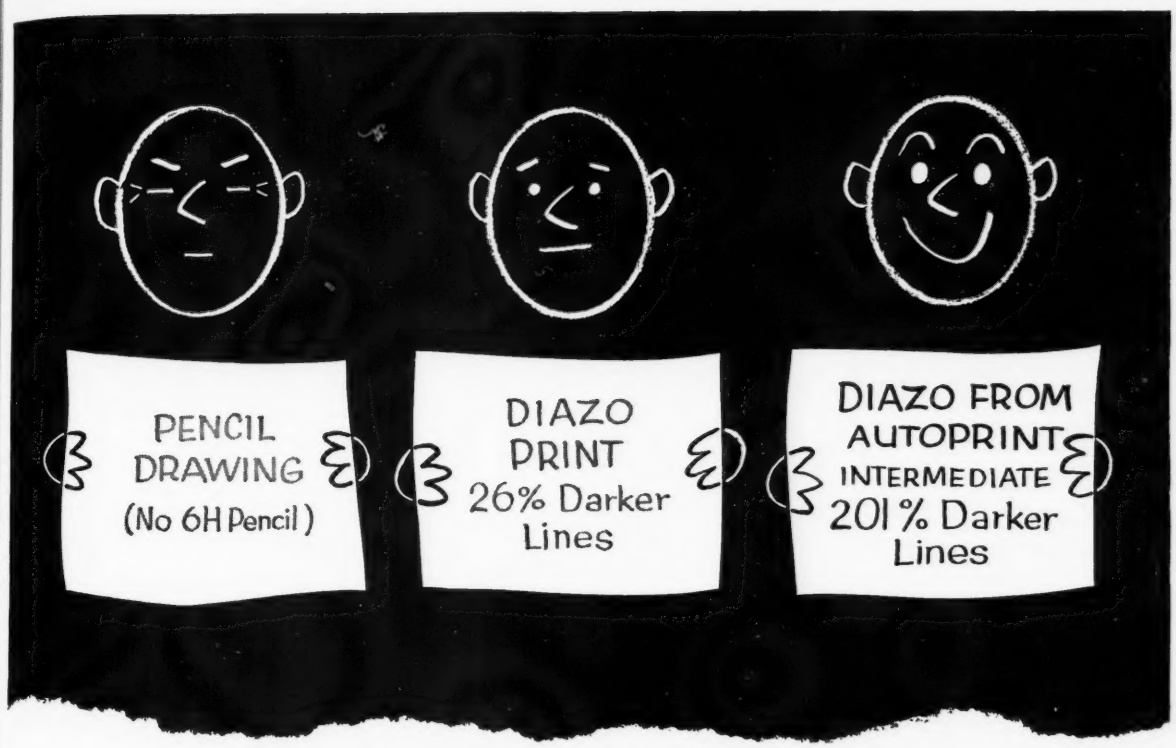
The question most asked by those just getting into the use of color is "which film?" I always feel that I am hedging when I try to give the only honest answer I can: it all depends. It all depends on what the picture is going to be used for, how it is going to be made, what are the limitations of budget, taking conditions, equipment necessary or available, and so on. Even then you must constantly be aware of the fact that wonderful as today's color is, it is temperamental, variable, and surprising. But most often it is wonderful!

Film varies not only from day to day and batch to batch, but because of the cumulative variables that occur with storage condition, age, taking condition, variation in lenses, shutter speeds, processing variables, may *appear* to vary within the same batch. These are not manufacturer's errors or flaws, but exist because of the very nature of the multi-layer color emulsion itself. Films from the same box, exposed identically, and processed but a few minutes apart may show measurable variation.

continued on page 54

Characteristics of color taking films available. * Indicates pushability varies with emulsion and subject matter.

FILMS	AVAILABILITY	GRAININESS	RESOLUTION	LATITUDE	PUSHABILITY*	COLOR CHARACTERISTICS
KODACHROME	35mm: Daylight Tungsten Flash	Extremely fine	Excellent	½ stop either direction	None. Processed only by Eastman Kodak or licensee. No manipulation possible	Intense, bright Moderate contrast
EKTACHROME E-1	Sheet: Daylight Tungsten	Moderate	Good	2/3 stop either direction	1 full stop satisfactory; 1½ stops under some conditions	Slightly cold, bright, contrasty
EKTACHROME E-2	35mm and rolls: Daylight Flash	Rather fine. Better than E-1	Very good	½ stop either direction	3/4 stop. Some subjects may allow more	Slightly cold bright, contrasty
ANSCOCHROME	35mm and rolls: Daylight Flash Sheet: Daylight Tungsten	Fine grain. Not as good as Kodachrome, better than E-1	Very good	1 stop either direction	1 stop excellent; 1½ stops acceptable	Soft contrast, warmish colors
SUPER ANSCOCHROME	35mm and rolls: Daylight (at present)	Rather fine. Not as good as regular Anscochrome	Very good	1 stop either direction	1 stop excellent; 1½ stops acceptable	Soft contrast, warmish colors
KODACOLOR	Rolls: Universal	Fine	Very good	½ stop under 1½ over	Slight control depending on end use	Depends on manipulation in end use
EKTACOLOR "S"	35mm and sheet: Universal	Very fine	Very good	½ stop under 1½ over	Slight control depending on end use	Depends on manipulation in end use
EKTACOLOR "B"	Sheet: Tungsten	Grainy	Fair	½ stop under 1 over	Slight control depending on end use	Depends on manipulation in end use



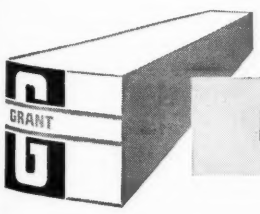
How to make

EASY TO READ REPRODUCTIONS!

Want to see blacker lines and clearer figures without squinting? Only a *photographic* intermediate of a pencil drawing intensifies the lines and increases contrast. Copies of any kind . . . blueprints, diazo prints, etc. . . . made from a photographic direct-positive intermediate look *better* than the same copies made directly from the original! And there is no finer direct-positive material than Grant Autoprint.

And you can choose the photographic material best suited for improving a drawing . . . one that makes a positive print without a negative, or that holds size, or that permits easy wet erasure, or that copies by reflex only the surface of drawings to avoid dirt and markings on the back, or one that is especially designed to build up weak lines to the maximum. Or a material combining several of these features.

Grant manufactures *the most complete line* of photographic reproduction materials for line drawings. 33 different materials are fully described in Grant's newly-revised Catalog K. Included is a guide to help you select the material manufactured specifically for each requirement. Write or phone for your free copy today! Grant Photo Products, Inc., 19000 Detroit Ave., Cleveland 7, Ohio. (Phone ACademy 1-8800).



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. . . for more details circle 530, page 65

Graphic Viewpoints

by EARL STANTON

REPRODUCTION INSURANCE

"Insurance" may sound a bit strange in this column but what I have to say about reproduction insurance could be very vital to many industrial plants who do not insure their original drawings.

Insurance in this case is a simple thing and very inexpensive. It requires making a second original on positive material and thus save the original drawing which may cost a company anywhere from $20 to $100 per square foot and even more. The original of a complex and intricate drawing is often thoughtlessly forwarded to the blueprint room where it is fed into a machine to make blue or white prints for plant use. Such handling would probably startle the factory manager if he knew this was taking place.

This valuable original drawing passes through a reproduction machine and is subject to tear and damage. The operator is handling a drawing perhaps worth $50 or $100 per square foot when this valuable piece of paper could be securely locked in the vault and equally as good or even better quality prints made from a second original that would have cost roughly 50 or 60 cents per square foot.

An original drawing should never be run through a reproduction machine *except* to make a second original on autopositive paper or film. To go a step further one should more than likely use a stable base film to make the second original master. This master would then be almost impossible to tear or damage and changes could be easily and economically made on the positive without endangering the original drawing. It would shake you up if you knew the companies (and major companies) who either through a lack of understanding or knowledge of materials available still risk valuable drawings in a blueprint machine when they could be insured for as little as 50 cents per square foot.

To protect the drawing from damage by making the autopositive is only one item of interest. There are many others. To illustrate: the original drawing is completed, a few prints are made from it, then a change comes along. Perhaps a wire is moved to a new part or a different part. If autopositive material has been used to make a second original changes can be made chemically on the master. The new wire or part is drawn in and then all prints needed run off the second original.

I hear all types of excuses at various times why different companies are not following through and making master positives: save space, save time, cannot see the value in protecting the original when a blueprint has been made, could make changes on the original just as easy, and so goes it. These are all pretty lame reasons for not doing something to protect a company whose very existence in 90 percent of the cases depends on drawings for their very life.

Autopositive materials are also of great value in reproducing an old, yellow and aged original. Normally it would be difficult if not impossible to reproduce from many of the old and aged paper drawings. Thanks to positive materials these drawings can and are being very successfully brought back to life.

In restoration of an old drawing, if the intermediate is made on an extra thin base medium the print backs can be as fast as 18 feet per minute. In watching a test recently we attempted to reproduce an old yellow drawing. Run through a diazo machine at three feet a minute one could never hope to use the print. The nomenclature had faded or was completely blank, lines were missing, etc. But this same old antique reflexed on autopositive thin base material and then printed back at 18 feet a minute looked far better than the original blueprint when the original was first drawn.

In summary I feel that anyone not now using masters to protect originals should very seriously study the situation and recommend to a person in authority that the company "insure" all their drawings. Every company insures equipment, buildings, their personnel, why not their very existence?

. . . ADDENDA

I had scheduled a column on microfilm equipment and new items for this month. Having seen some of the most amazing new items and having heard about others ready to be released left me with one idea . . . wait.

Perhaps the next column will find me armed with all the material I need to discuss microfilm and some of these advances may put microfilm, a very valuable phase of photography, in the spot where it belongs.

The J. A. Maurer Co. will soon have available a new compact processor for film through which 16, 35 or 70 mm can be run at a rate of about five to six feet per minute. This item has long been needed and will be favorably received I am sure. Oscilloscope film can be processed in the same unit at 15 feet per minute. □

NEW!

The color film that changed the standards of still photographers everywhere is now available as a 16mm motion picture stock.

SUPER ANSCOCHROME 16mm FILM

Daylight-exposure index 100

● This premium color emulsion, widely accepted and acclaimed in still work, has been made available in 16mm width for motion picture photography. Its speed of 100 makes it the most useful film for all phases of industrial cinematography where speed and superb color renditions are called for. Super Anscochrome's improved curve conformity, characteristic of all Anscochrome emulsions, provides a color balance that has never been achieved in any other color film. It combines high speed, good latitude, clean highlights and superior shadow area penetration—all so desirable for high speed motion analysis, stress studies and data recording as well as routine work where a reserve of speed is needed. And, Super Anscochrome's high speed does *not* mean a loss of quality. Its design is such that the speed becomes an added feature to the already outstanding characteristics of Anscochrome emulsions.
Also available in 35mm and 70mm. *Ansco, Binghamton, New York. A Division of General Aniline and Film Corporation.*

Ansco

Super Anscochrome 16 mm Film

. . . for more details circle 502, page 65

As Others See It

by LLOYD E. VARDEN

MOTION PICTURES SOLVE INDUSTRIAL VENTILATION PROBLEMS

An article in the November 9, 1957 number of "Chemical Week," pages 45-46, describes an application of time-lapse motion pictures for solving ventilation problems in industrial plants. A major difficulty facing ventilation design engineers is the proper location of fresh-air intakes and the height of exhaust stacks to prevent downwash, i.e., recirculation of discharge air due to turbulent eddies caused by nearby structures. The designer also seeks to prevent the hot and often smoky exhaust from descending to ground level on a nearby traffic lane.

In the sodium plants of DuPont at Niagara Falls, N. Y., an extensive ventilation system is to be installed. To do the job right, the engineers hoisted portable, lightweight television towers and set off smoke bombs at different altitudes. The smoke plumes were recorded on 16mm motion picture film in a time-lapse camera system that exposed one frame per second. The films were later projected for standard speed and for slow motion so that a detailed study of turbulent eddies, downward, etc., could be made. The TV towers were positioned at ten different locations and motion pictures were taken under twenty-four wind conditions as the smoke bombs were released. White smoke grenades, HC-108, are available from Federal Laboratories, Saltsburg, Pa.

IMAGE HOLDING METHOD

"The New York Times" for Sunday, November 3 reported a development of RCA (described before a conference of radio engineers on November 1, 1957) on image holding or image display devices. The devices retain a light projected image of only a fraction of a second duration for several minutes.

The simpler of the two devices is based on a newly discovered property of cadmium selenide. This compound is a photoconductor, meaning that in darkness it is an electrical insulator but when exposed to light becomes a conductor. It was found that if the electric current is kept on, the cadmium selenide retains its conductivity for some minutes after the light is cut off. Thus, an image projected onto a cadmium selenide surface for a fraction of a second establishes conductivity points that remain and which allow the formation of a stable visible image via electroluminescent means.

The second device also makes use of photoconductive and electroluminescent materials arranged in small cells of as many as 1600 per square inch. But the retention of the image is accomplished by an optical feedback process. If you are interested in the technical aspects of this subject you can refer to a paper in the October, 1957 number of the "Journal of the Optical Society of America" by B. Kazan and F. H. Nicoll entitled "Solid-State Light Amplifiers."

PHOTOGRAPHIC GOAL FOR U.S. INVENTOR

Also in the November 3 "Times" was an amusing tidbit tucked away in an article on page 118 under the title "Goals Are Listed for U. S. Inventors." After a general discussion of death ray devices, greaseless ball bearings, etc., sought by the National Inventors Council, a list of old stand-bys on the Council's records is given. Among them is the following:

> "High speed photographic film to permit exposure by the light of the full moon at 1/200th of a second."

CIRCARAMA PROCESS

If you have never been to Disneyland in Anaheim, California to witness a demonstration of the Circarama Process you might be interested in reading a popular description of it in the October, 1957 issue of "International Photographer," pages 14-15.

It is a 360-degree motion picture process in which eleven synchronized cameras arranged in a complete circle are used. A circular projection screen is necessary for showing the resulting films and the viewer is located near the central pivot. The viewer has a strong feeling that he is participating in the action seen around him. When a scene is shown that was taken from a moving car, for example, the viewer braces himself at each turn and feels muscular reactions which give a sensation of a completely real experience.

Incidentally, the Circarama Process will be one of the features in the U. S. A. exhibit at the Brussels World's Fair which opens in April, 1958.

INDUSTRIAL COLOR SHOTS WITH COLORED LIGHT

Dr. Hans Baerend, writing in the German Edition of "Grossbild-Technik" (No. 3, 1957), pages 50-51, suggests the use of colored spot lights for obtaining novel effects in industrial color photography. His illustrations make the system quite evident even if you do not read German.

Briefly, the method consists in using a 500-watt spot light on each side of the camera directed toward the subject at an angle of 45 degrees. Color filters, say blue and red, are used in front of the respective spot lights. Now objects in the scene will form deep shadows if the spots are turned on separately. But when both spots are on the "shadows" formed by the blue spot will be illuminated by red

continued on page 51

NOW 2

Famous Pan-Cinor Varifocal Lenses for Arriflex 16 & 35 Cameras

No camera is so well suited for the Pan Cinor's as the Arriflex!

PAN-CINOR 150

By simply moving a lever, you can vary the focal length of these lenses from wide angle to telephoto — and back — smoothly. You observe the results even while shooting, as you view the image through the Arri Pan-Cinor lens in the Mirror Reflex viewing system of the Arriflex. No external finder is needed.

The Pan Cinor saves expensive "dolly" shots as the camera can remain in one position and a dolly effect obtained by "zooming."

SPECIFICATIONS

	Model 70	Model 150
Varifocal Range:	17.5mm to 70mm	38.5mm to 154mm
Aperture Range:	f:2.4 to f:22	f:3.8 to f:22
Focusing Range:	6½ feet to infinity	7 feet to infinity
Can be used on:	Arriflex 16 only	Arriflex 35 & 16
Built-in lens hood filter holder:	Yes	Yes
Filters:	Series VIII	Special size
Weight:	28 ounces	4¼ lbs.
Overall length:	6½"	10"
Price:	$360.00	$1,310.00*

*Prices slightly higher on the West Coast

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. . . for more details circle 545, page 65

NEW EQUIPMENT

continued from page 15

tions, the cutter comes also with a 400-foot roll holder, a frame counter, and a foot switch. Price, without extras, $395.

Two Developing Tanks 109

Ansco has disclosed it is marketing its Developing Outfit No. 2 and a smaller model designated as No. 1. The number one contains the new Anscomatic developing tank, a professional-type contact printer with safe- and printing-light, three trays and various accessories and chemicals. The No. 2 sells for $15.95 and the No. 1 without the tank is priced at $10.95.

Each new product item listed here has a key number, referring to Readers Inquiry Card, page 65.

Kilfitt Adapters 110

Two new adapters permitting the usage of the Kilfitt 90mm Makro-Kilar and 150-300-400-600 lenses on Praktina cameras is now available from *Kling Photo Corporation*. The new adapters permit a wider range of application on universal mounts. The Retin adapter for the 90mm Makro-Kilar sells for $12.00 while the Kitin adapter for the other lenses lists for $24.50.

Paper Backed Tape 111

A new double coated, paper backed, rubber based adhesive tape for mounting rubber printing plates in the graphic arts industry has been announced by the *Minnesota Mining and Manufacturing Co.* With an adhesion of 80 ounces per inch of width, the high shear strength tape is available in widths from ½ inch up and in 36-yard rolls. Available as Scotch No. 401.

Photorapid Copier 112

Pacific Copy Corp. has announced a new four-model line of photo-copying machines, used in any light with a combined developing and printing chamber at a speed of two seconds. Available in five colors. The combined model will take copy up to 19″ in width and any length.

Colored Paper Cutter 113

The 1958 models of *Michael Lith Inc.* paper cutters will be painted office green to match decors. Of three standard sizes, heavy steel construction permits cutting rates up to 5,000 sheets in 10 minutes.

Safelight Sink 114

A darkroom sink with built-in developing section safelight has been announced by *Kreonite, Inc.* Designated as Model No. 2024, the new model also has a control panel from which developers, water, temperature, and sprays are centrally controlled. Made from lightweight, colorful fiberglas, the sink was designed especially for the graphic arts field.

3¼ x 4 Slide Changer 115

A slide changer for 3¼ x 4 slide projectors is being manufactured by *Genarco Inc.* which will hold up to 70 slides, remotely inserted by a lecturer on cue from a script. The electrified slide action takes place in ½ second. The Model 6800 changer will fit most projectors.

Polycontrast Papers 116

Eastman Kodak Co. has announced two new polycontrast papers for warm-tone printing. The first is Polycontrast Paper G, double weight, with a fine grain luster surface. The other is Polycontrast Rapid Paper F, double weight, especially created for photographers using DW glossy papers. Paper is said to be free from wet abrasion and to have a minimum of curl.

Projection Screen 117

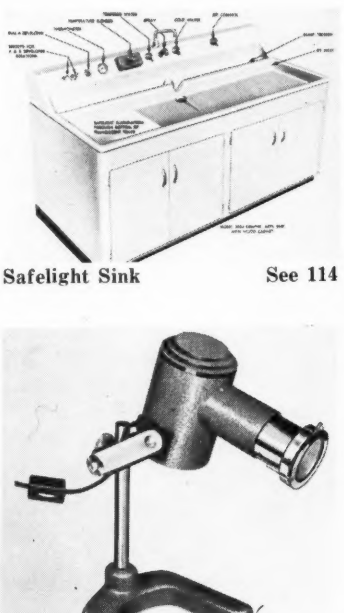
A new daylight rear projection screen is being marketed by *Polacoat Inc.* that permits overlays and chalk marks to be made on its surface during a screening without obstructing vision of viewers or damaging the screen. Made from 1/16 to 1/2″ in thickness by 6-foot squares, the screen is a rigid Plexiglas lenticularly treated and optically cast. Called the Lenscreen, the new model allows projection equipment to be removed from the audience area during showing.

Plastic Photo Trays 118

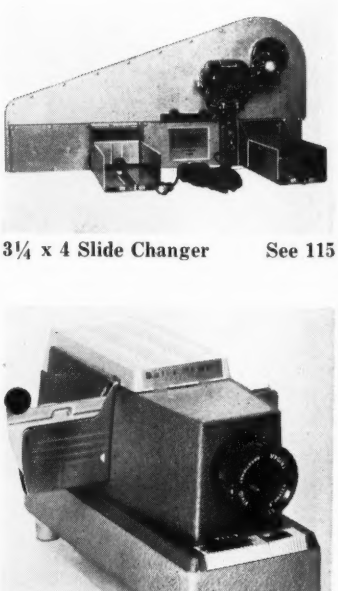
White styron plastic photo print trays are a new product being featured by the *Richard Manufacturing Co.* Said to be durable and acid-resistant, the trays come in print sizes ranging from 8 x 10 to 20 x 24, with a deep, hypo tray that is 14 x 17 x 6″. Featuring a pouring lip, and tapered sides for stacking, the trays also have rounded corners and a very smooth inside surface. Price, 8 x 10, $2.35.

Bright Beam Lamp 119

A new, sliding focus bright beam inspection lamp for close-up bench or table work has been designed by *Edmund Scientific Co.* With a variable spot from ⅝-inch to about 3″ in different degrees of intensity, the lamp is focused by sliding the tube back and forth. Equipped



Safelight Sink See 114



3¼ x 4 Slide Changer See 115

Bright Beam Lamp See 119

707 Projector See 120

with lamp and daylight filter on a sturdy stand, it is priced at $27.50 postpaid.

707 Projector 120

A very compact blower-cooled 300-watt 35mm slide projector with a five-inch, *f*/4 coated lens has been announced by *Bell & Howell.* With a manual changer, the new model 707 will take Superslides as well as 2 x 2 and Bantam slides. Price: $39.95.

4 x 5 View Camera 121

The *Calumet Corporation* recently announced a new all-metal 4 x 5 view camera designed primarily for professionals in commercial and industrial studios. Instant positioning, with a rising and falling front, and a rotating back permits unusual angle and background shots. The model 415 is said to be free from distortion. It is a light weight model, with large adjusting knobs, reported to be a companion to the Calumet 8 x 10 Universal model.

Rapid-Exposure Stat Paper 122

HeccoStat, a speed paper with orthochromatic emulsion for fast projection speeds in stat cameras, is reported by *Hunter Photo-Copyist Inc.* to give high densities and excellent tone separation qualities. The new paper is available in widths from 8½ to 18" at comparable prices.

Each new product item listed here has a key number. For more information on the subject, circle the same number on the Readers Inquiry Card, page 65.

Plastic Laminator 123

The *American Photocopy Equipment Company* has announced a "Ply-On" laminator which completely encases one or both sides of an original paper copy with a very thin triacetate plastic film in about 10 seconds. A letter-size original is inserted in the electrified 10x15 machine, operated with either a push button or a foot pedal, and comes out coated to make it impervious to moisture, dirt, cracking, etc. Cost is said to be about five cents for each sheet double coated.

B&W Prints From Color 124

A new panchromatic enlarging paper which produces black-and-white prints directly from Ektacolor and Kodacolor negatives without filtration is being placed on sale by the *Eastman Kodak Co.* At a recent demonstration, the new paper gave comparable results obtained from standard pan film negatives. The new product will be available in one contrast grade, E double weight, ranging in size from 5x7 to 16x20. Standard developers are used, while the speed of the paper is said to compare with Kodabromide. The price of the new product will be slightly higher than other papers.

35mm Recording Camera 125

A miniaturized 35mm interval and motion picture camera has been introduced by *Pacific Laboratories.* Camera has turret lens mount, daylight load magazine, with exposure rates of 10 frames per second to as slow as desired. Electric drives, as well as a 16-35mm panoramic frame size, are also available.

continued on page 52

Stewart *ONE*PIECE *Seamless* REAR PROJECTION SCREENS

One of These Three Fits Most Needs

LUXCHROME — **FOR VIEWING** slides or motion pictures under roomlight conditions; for business, education, research, advertising, display.

PROCESS — **FOR PHOTOGRAPHIC BACKGROUNDS;** special effects in motion picture and commercial still photography.

TV BLUE — **FOR TELECASTING** live action in studio against projected "location" backgrounds.

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STEWART . . . the screen preferred by 9 of the top 10 Hollywood motion picture studios . . . gives you brilliant, sharply defined rear projected images for either viewing or photographing.

You, too, can now have the quality of Stewart award-winning screens, born of the demands of critical motion picture and TV studio technicians. Here is the one truly *one*piece screen for perfect rear projection, made in all sizes from table-top to large set proportions.

Specialists in professional screens: rear and front projection.

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Send sample swatches of: LUXCHROME ☐ PROCESS ☐ TV BLUE ☐
Please send full information on award winning Stewart screens.
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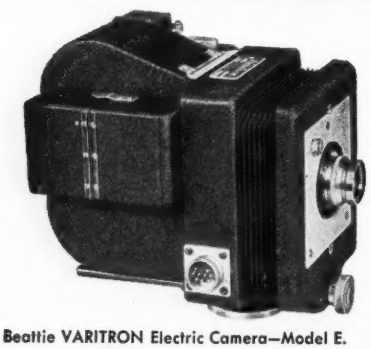
. . . for more details circle 578, page 65

Beattie

ELECTRIC CAMERAS
For Business, Industry and Research . . .



Beattie VARITRON Electric Camera—Model E.

These modern, rugged cameras are designed for remote control operation, and automatically record any object or event on film . . . at fixed time intervals . . . or at random intervals, if desired. Known as demand-rate or pulse-type, they do not require an operator—an electrical pulse or signal causes the camera to take one or more pictures automatically without attention.

- Permit data recording under conditions where the use of a manual type camera or presence of an operator would be impossible.
- Offer greater flexibility, accuracy, and economy than any other known system of data recording.
- Use either 70mm or 35mm roll film for widest range of picture size.
- Ideal wherever data is recorded and stored for future analysis and reference, such as photo recording of meters, production-line operations, under-water life, etc.

Write today and we will send you our complete catalog as well as answer any questions you may have concerning your data recording needs.

Write today for complete detailed specifications and prices.

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ACKNOWLEDGED LEADERS IN THE MANUFACTURE OF ELECTRIC CAMERAS

. . . for more details circle 506, page 65

PHOTOGRAPHIC Science & Instrumentation

TERRAIN PROFILING WITH RADAR AND PHOTOGRAPHY

by W. C. EDDY, CAPT. USN (Ret.)
Television Associates

We are all familiar with the adage of a picture being worth a thousand words, but few of us have had reason to combine photography with radar to present the full solution to a problem that cannot be properly described in words alone.

This, however, is the ultra-modern approach used by Television Associates of Indiana in charting the cross-country microwave paths used in modern telecommunications.

These microwave transmission paths, utilizing frequencies of such short wave length that the signal travels in a straight line between towers, require a very accurate establishment of the transmitting site location, the nature of the terrain between the sites and the height of each tower which will permit line-of-sight contact.

Original Method

Originally these routes were established by laborious ground surveying, a method which many times proved inaccurate, costly and time-consuming. In addition, the results of such a survey were generally limited in scope and subject to considerable interpretation during the process of construction.

In order to expedite the gathering of such data, as well as to provide the additional information deemed important in the establishment of these routes, Television Associates of Indiana conceived the idea that by combining the potentials of photography, radar and the airplane, it would be possible to assemble sufficient accurate data for design and construction of such links in a fraction of the time required by other methods. In 1945, the first application of this airborne system was successfully demonstrated in surveying the microwave paths between Chicago and South Bend for a television relay network from WBKB to Notre Dame. Since then many thousands of miles of these paths have been established, both here and abroad, by this combined photo-radar-plane combination.

Basically, the system uses a specially equipped airplane as a movable observation platform which can be moved over the path to be developed. Radar equipment housed within the cockpit sends out a continual series of probing impulses towards the ground and converts the echo received into feet of altitude, thus determining the distance of the ground from the body of the plane. By further instrumentation the altitude of the plane above sea level at time of measurement is accurately determined from the atmospheric pressure exerted on a complex strain gauge instrument, which, in turn, resolves this information into feet and records it on a visual dial. By subtracting the radar distance between plane and ground from the measured altitude of the plane, the actual height of the ground above sea level can be immediately computed. By continuing this process over the full path between the selected tower sites, a graphic picture of the terrain can be quickly obtained once this material is collected from the instruments and interpreted.

Stop Frame Camera

In order to sequentially assemble the various pieces of information that will be required in such an analysis of the path, a stop frame camera is employed, with its electronic shutter being fired at a fixed time interval by use of an intervalometer, or mechanical timer. By this means, all of the data on the instrument board is collected on separate motion picture frames which can be later identified and related to specific points along the path.

This camera, specifically selected for this application, is a Siemens recording camera. It is a magazine-type unit permitting

ILFORD film

wherever research is reported

Remote handling of isotopes at the Radiochemical Centre, Amersham, England.
Photo courtesy United Kingdom Atomic Energy Authority. Photographed on Ilford HP3 roll film.

ILFORD HP3 is a fast (ASA 200) panchromatic film that offers an unusually long scale of gradation and excellent grain quality. It can be used either in artificial or natural light with equally superb results. This combination of versatility and high fidelity makes Ilford HP3 the ideal film for recording visually the techniques and processes of modern research . . . an invaluable tool for scientist and engineer. HP3 is obtainable in all standard roll and sheet sizes from your regular supplier—or write the address below.

Try the full range of Ilford enlarging papers—Bromide, Plastika, Multigrade.

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. . . for more details circle 541, page 65

1600 pictures to be taken sequentially at a maximum speed of 8 per second. A solenoid operated shutter activated by the intervalometer exposes the film at preselected speeds between 1/150th and 1/600th per second. The film is automatically advanced between exposures with alternate frames being identified by a number. The camera used in this recorder requires a 24-volt supply and is equipped with a 10mm, *f*/1.9 lens.

In interpretation, this film is projected in the negative through a Craig viewer to permit tabulation of the data and analysis of the path as it progresses.

This equipment, housed in a bulging container, is affectionately termed "the Dagmar" by the pilots who fly it over the uncharted paths and from this unit we derive a good portion of the information required.

One element of the path that is not disclosed by this "Dagmar" is the height of the trees or man-made obstructions that dot the terrain beneath the plane. These trees or buildings will, like actual hills, obstruct the line-of-sight between the towers and, therefore, they have to be accurately located, measured and plotted along the profile itself.

Determination of this tree height is obtained by photogrammetric analysis of a three-dimensional picture of the ground, related by frame number to the camera recording the radar and altitude data.

Faster Shutter Speed

This vertical camera is also a Siemens, modified to increase the shutter speed in compensation of the high relative speed of the low flying plane over the ground. In obtaining these pictures the elevation of the plane is seldom over 500 feet, which distance at 150 mph requires a shutter speed of approximately 1/600th per second, to accomplish acceptable image stoppage. The exposure rate of this camera is similarly controlled by a second intervalometer which spaces the sequential pictures satisfactorily for photogrammetric interpretation.

In analyzing the vertical height of the object disclosed on a pair of these pictures, the principal of differential parallax is employed wherein the parallax at the base of the object or ground is related to the parallax reading from the top of the object and by computation against photo base and vertical altitude at the time of exposure, the exact height of the object can be accurately determined within close limits.

This camera is operated by the pilot who can, by depressing a switch on his steering column, fire a properly separated series or "burst" of pictures when the occasion arises. Cross identification of these vertical shots with

continued on page 56

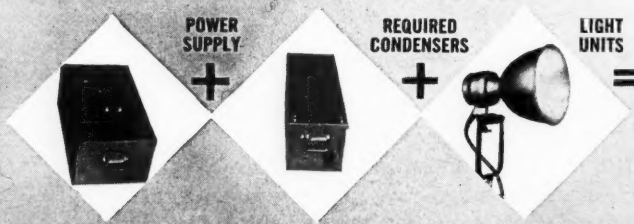
ascorlight®
series 800

CUSTOM INSTALLATIONS FROM STANDARD COMPONENTS

The Ascorlight series 800's are highly powered speedlight installations made up of basic standardized components, and are primarily used for large set color photography. Each installation is planned to give the studio the proper amount of power, number of light units, and ratio of power required. Installations can vary from a one-light 800 watt-second unit to ten or more lights with thirty to forty thousand watt-seconds. A wide range of accessories are available to provide critical control for properly lighting a set. Thus, you can have a "custom built" installation planned specifically for your work at a minimum cost.

Illustrated above — typical series 800 ascorlight installation with 12 condensors — total 9600 Watt-Seconds

Series 800 components provide a "building block" type of design that makes possible a multitude of combinations. Any number of light sources, ratio of power, etc., can be arranged.



"CUSTOM MADE" installation tailored to your specific needs.

Write for Series 800 data sheet and name of your local authorized Ascor dealer . . . also information on Ascor's Equipment Leasing Plan.

Only ascor makes a complete line of Speedlights

AMERICAN SPEEDLIGHT CORPORATION

63-01 Metropolitan Ave. • Middle Village 79, N. Y.

. . . for more details circle 501, page 65

How to Select the Right Screen for YOU!

There is a type and size screen that is most efficient for every projection need. To get the most out of any projection program—it is extremely important that the right screen be employed. Out of many years of experience in working with all types of projection—under every possible condition—Radiant has compiled a basic set of guiding principles in screen selection that have proven a great help to thousands of projection screen users.

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MOVIE CLINIC: Technicians on Techniques

PROJECTION PROBLEMS

by T. G. MAYNARD
Deputy Director for Presentations—Publications Div. Department of the Navy

Too often my learning has progressed in typical fashion. First I learn how *not* to do it, and then, of course, how best to do it.

This process held true when the cause of projected visual presentations was brashly championed in the Navy. As usual a quick "come-uppance" was received. On this particular occasion, a series of slides had been prepared for use on an overhead projector. In a progressive mood, a translucent screen had been procured and it was proposed to project these slides from the rear and through the screen. "This would remove the distracting effect of projector operation from the view of the audience and improve audience attentiveness"—it says here!

Everything worked fine, except that the audience composed of an Assistant Secretary of the Navy, several Admirals and other officials could see only a ghost of an image on the screen. The reason was immediately apparent. The conference room which had been chosen for its accommodations and dimensions had a long row of windows on the east side of the room and no drapes. Well, no projector can successfully compete with the sun and if I had ever doubted that the sun rose in the east I was then convinced to the extent that I foreswore any future attempt to test the direction of the setting sun by the same method.

But light is only one of the limitations that control the effective use of projection equipment. There are four other factors that must be coped with to assure effective projection:

1. How big the audience?
2. How big the screen?
3. How big the room?
4. How far from projector to screen?

The answer to any one of these questions automatically sets the maximum or minimum size of all others. For instance, given the size of the audience, one can determine immediately the *smallest* size screen that will serve; the *smallest* room that

TYPE OF SCREEN	WIDTH OF PICTURE ON SCREEN						
	4' (8'-24')	5' (10'-30')	6' (12'-36')	7' (14'-28')	8' (16'-48')	9' (18'-54')	10' (20'-60')
Beaded screen	32	50	72	98	128	162	200
Matte screen	53	83	120	163	213	270	333

Table 1. Size of audience and limits, in parentheses, of screen distance.

LENS FOCAL LENGTH	WIDTH OF PICTURE ON SCREEN						
	4'	5'	6'	7'	8'	9'	10'
3/4"	7.9	9.9	11.8	13.8	15.8	17.8	19.7
1"	10.5	13.2	15.8	18.4	21.1	23.7	26.3
1 1/2"	15.8	19.7	23.7	27.6	31.6	35.5	39.5
2"	21.0	26.3	31.6	36.8	42.1	47.4	52.6
2 1/2"	26.3	32.9	39.5	46.5	52.6	59.2	65.8
3"	31.6	39.5	47.4	55.3	63.2	71.1	78.9
3 1/2"	36.8	46.1	55.3	64.5	73.7	82.9	92.1
4"	42.1	52.6	63.2	73.7	84.2	94.7	105.3

Table 2. Distances for 16mm sound movie projector, aperture — .380".

Unusual picture of shooter actually firing Model 70 Winchester rifle. High velocity 270 Winchester bullet is shown in flight approximately six inches from muzzle, and before evidence of recoil is visible. Picture made in Winchester-Western Research Ballistic Laboratory of Olin Mathieson Chemical Corp., East Alton, Illinois plant.

Two lighting units were required to cover the wide field of view. Each light has approximately two microseconds flash duration. Even with two lights the broad coverage required resulted in a very low intensity of light demanding extremely large lens aperture. Sharpness was maintained making full use of shifting and swinging front and back of Graphic View Camera.

OLIN-MATHIESON Saves 6 Ways with Graphic*-Equipped In-Plant Photo Dept.

Unusual and interesting photographs for record and even pictorial results are made possible with availability of extreme tilts and swings found on Graphic View Cameras.

This unusual picture was made in the Western Brass Division of Olin-Mathieson Chemical Corp. at East Alton, Ill.

Like most other firms having in-plant photo departments, Olin-Mathieson Chemical Corporation depends on Graphic and Graphic View Cameras to satisfy its picture needs. Speed Graphics were chosen "for the availability of faster focal plane shutter speeds (up to 1/1000 second) for special uses." Graphic View cameras have proved invaluable "for their versatility, for close-up work and work requiring perspective and distortion control." These cameras perform many photographic jobs from photomicrography to aerial photography.

Olin-Mathieson figures its Graphic-equipped In-Plant Photo Department benefits the company in six ways:

1. **Engineering time often is reduced from weeks or months to days.**
2. **Development problems are speeded up.**
3. **Production problems are solved more quickly.**
4. **Administrative time in securing photo service is saved.**
5. **Highly specialized photo services not commercially available can be employed at any time.**
6. **Actual production costs are 30% to 50% below comparable commercial service costs.**

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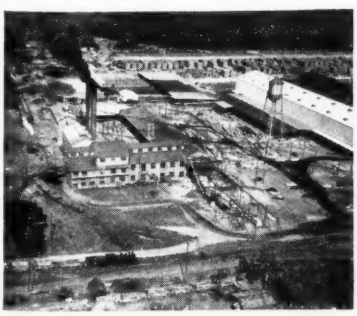
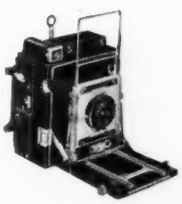


Aerial obliques can be made without specialized equipment on short notice using short exposures from Speed Graphic focal plane shutter. This partial view of Frost Products Division Mill at Huttig, Arkansas, demonstrates versatility of equipment.



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will do; and the *exact* distance any projector will have to be from the screen. If on the other hand, one has a screen of certain dimensions, one can positively determine, how big an audience can be served; how big the room needed, and what kind of a projector and where placed.

In this last sentence you have perhaps noted that I slipped in a "fast one," the reference to "what kind of a projector." By this, I do not mean a choice as between overhead, slide, film strip or movie projector, but rather the focal length of the lens on the projector, for the lens focal length determines how far the projector must be placed from the screen. Neglect of this important factor can easily, as it so often has, result in the projection of an image that looks about the same size as a postage stamp does on a letter.

Of course, all these factors are susceptible of mathematical computation and interrelation. But let's do it the easy way—with tables. But before looking at the tables let's look at the bases for their construction.

Most frequently, the urge or need to project visual material is related to a specific audience, thus the size of that audience becomes the controlling factor in determining the size of screen, the room and projector characteristics and location.

There are several points to be considered about an audience. First, an audience is composed of "individuals" and each individual requires floor space — seated, about six square feet each. Second, an image of a given size to be viewed comfortably must not be too close or too far away. And third, because of the reflective patterns of differing types of screens, the angle from which

continued on page 60

LENS FOCAL LENGTH	WIDTH OF PICTURE ON SCREEN						
	4'	5'	6'	7'	8'	9'	10'
2"	8.8	11.0	13.2	15.5	17.7	19.9	22.1
3"	13.2	16.6	19.9	23.2	26.5	29.8	33.1
3 1/2"	15.5	19.3	23.2	27.0	30.9	34.8	38.6
4"	17.7	22.1	26.5	30.9	35.3	39.7	44.2
5"	22.1	27.6	33.1	38.6	44.2	49.7	55.2
6"	26.5	33.1	39.7	46.4	53.0	59.6	66.2
7"	30.9	38.6	46.4	54.1	61.8	69.5	77.3
7 1/2"	33.1	41.4	49.7	57.9	66.2	74.5	82.8
9"	39.7	49.7	59.6	69.5	79.5	89.4	99.3
10"	44.2	55.2	66.2	77.3	88.3	99.3	110.4
11"	48.6	60.7	72.8	85.0	97.1	109.3	121.4

Table 3. Distances for single frame filmstrip projector, aperture—.906".

LENS FOCAL LENGTH	WIDTH OF PICTURE ON SCREEN						
	4'	5'	6'	7'	8'	9'	10'
2"	6.0	7.5	9.0	10.4	11.9	13.4	14.9
3"	9.0	11.2	13.4	15.7	17.4	21.1	22.4
3 1/2"	10.4	13.1	15.7	18.3	20.9	23.5	26.1
4"	11.9	14.9	17.9	20.9	23.9	26.9	29.9
5"	14.9	18.7	22.4	26.1	29.9	33.6	37.3
6"	17.9	22.4	26.9	31.3	35.8	40.3	44.8
7"	20.9	26.1	31.3	36.6	41.8	47.0	52.2
7 1/2"	22.4	28.0	33.6	39.2	44.8	50.4	56.0
9"	26.9	33.6	40.3	47.0	53.7	60.4	67.2
10"	29.9	37.3	44.8	52.2	57.7	67.2	74.2
11"	32.8	41.0	49.3	57.5	65.7	73.9	82.1

Table 4. Double frame filmstrip and 35mm projectors, aperture—1.34".

Camera finds traces of a Roman 100-room villa on airfield site at Centocelle, Italy.

Rectangular garden wall and the ditch of Roman villa, Ditchley, England, shown in photo below.

CAMERA HELPS ARCHEOLOGISTS DIG FOR BURIED CIVILIZATION

Aerial photographs are now very extensively used for archeological purposes. A recent article by Franco Cocchi appearing in "Ferrania" points out that they help especially in recording shadows projected on the ground by the sun when it is low on the horizon, variations in the height and color of vegetation, and characteristic coloring of the ground caused by buried substances of archeological interest.

For instance, more or less homogeneous strips of particularly well-developed vegetation usually mean that the vegetation is growing over the site of an ancient ditch where the roots find especially good conditions. In fields of flourishing wheat, areas or strips of slightly stunted growth usually indicate the remains of walls, foundations or pavements which have prevented the roots from growing properly.

The aerial photographs are chiefly vertical views taken from medium heights of about 5000 feet and using stereoscopic effects. The photographic plane makes several passes over an area to obtain a series of photographs which will later be juxtaposed and mounted to provide a complete view of the territory.

Square negatives of six or eight inches along the side are usually employed. Panchromatic emulsions are generally used, but infrared photography is often useful. A wide range of colored filters is required, depending on the coloring of the ground and the vegetation.

Although both plates and film are used, plates offer better results because they are absolutely flat and produce sharper and more brilliant images. Stereoscopic plates are more fruitful than ordinary plates and will be even more so when they are taken in color.

Color has already been applied to archeological research. Its extensive use will probably greatly enlarge the field of investigation and possibilities of discovery. Fine details can be distinguished much more easily when they appear in different colors than in various shades of gray. □

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Related Reading

Focal Encyclopedia of Photography

by Frederick Purves and Board of Editors, The Macmillan Co., New York, 1298 pp., $20.

Writing or compiling a dictionary or encyclopedia on a subject as broad and as ever changing as photography, is much like trying to describe nuclear reaction: every minute something new is added and the history of development is endless. The Focal Encyclopedia, heralded as a major photographic publishing event, is an outstanding work, fascinating, readable, comprehensive.

Compiled by some fifty experts, illustrated profusely with photographs, both in black and white and color as well as charts, graphs, and simple pen drawings, it encompasses the realm of photography from A (abaxial) to Z (zoom lenses) in terms of every phase and aspect from the business of photography to the theoretics of the latent image. Serving as a rather complete reference library in one volume, the encyclopedia is just that. The publisher, in his preface, has summed it up quite neatly in his statement, ". . . primarily designed for readers with an active interest in photography. This policy helped to define not only the extent to which information should be offered, but also its level." Specialists have contributed authoritative articles which are complete in themselves.

Although the immediate critical reaction of the American technician appraising a British book is to be offended, or at least alerted, by the obvious differences in nomenclature, and one is aware of the British emphasis, yet, the editors are to be commended for their inclusion of many American parallels. And this reviewer was delighted to note that several American specialists contributed articles in their distinctive fields. (For example, Max Factor has done a piece on Make-up for Photography; Dr. Edgerton on his specialty). And there are other non-British authorities contributing as well.

To run through subject by subject is impossible—but note that there are such fascinating exotica as: how to make bellows, a historical chronology of development of photography, a well diagrammed section on view-camera movements, biographies of every conceivable photographic personage from Abbe (Ernst, 1840-1905) to Zeiss (Carl, 1816-88) with a paragraph or more on their contribution and status.

And then there are lists (of course alphabetical) of chemicals used in photography, conversion scales of film speed indexes, standard paper sizes in both inches and centimeters, sensitized materials used in copy work, and exposure tables dependent on latitude, season of the year and hour.

And this goes on. I found it fascinating reading, a quick refresher course on a dozen photographic subjects I wanted to brush up on, and suggestions, hints, techniques and practices that every working (or thinking) photographer will want to use. This book is a *must* for every industrial photographic laboratory, for every technical laboratory library, and most photographers who read or take an interest in their work will want a copy for their very own. I found it more fascinating than a Sears Roebuck catalogue, and educational as well. Highly recommended.—D. B. E.

Laboratory Glassblowing

I. M. Parr and C. A. Hendley, Chemical Publishing Co., New York, N. Y., 149 pp., $4.00.

Although not directly a book for the industrial photographer, we must mention this excellent volume here as many of our readers are employed in research laboratories or work with laboratory equipment.

Quite unique in technical publications, this book deals with theory and practice in actual working with various types of glass used in laboratory equipment, discusses thoroughly the tools and equipment necessary, and takes one step by step through actual glass-blowing practice from simple flanges to more complicated inner seals and stop-cocks.

If you ever have to design or use complicated glassware in your laboratory, this book will save you many hours, and with a little practice and patience, a good deal of money, as well. Be sure to call this to the attention of your laboratory chief. Should be in every lab's technical library.

The 1957 Editorial Index for "Industrial Photography" is now being prepared for distribution in January 1958.

AS OTHERS SEE IT

continued from page 38

light, whereas the "shadows" formed by the red spot will be illuminated by blue light. The foremost parts of each object will be illuminated by both red and blue light. It is not difficult to visualize the array of colors possible if more than two colored spots are used.

PRINCIPLES OF DEVELOPER REPLENISHMENT

In the September, 1957 number of the *Journal of the Society of Motion Picture and Television Engineers*, pages 555-557, is an interesting article on concentrated developer replenishers. Although the article concerns replenishers for Eastman Color Films, the general principles presented are applicable to almost all replenishment problems.

Authors George E. Cummins, Jack A. Cogan and William R. Weller point out that when film is processed, the developer loses activity because some of its constituents are chemically changed, organic by-products are formed, and halide ions accumulate during the reduction of the silver halides in the film emulsions. To maintain the developer activity at a satisfactory level and also keep the solution volume more or less constant, a replenisher must be formulated and used at a rate that will:

1.) replace chemicals consumed or chemically changed in the development process;

2.) maintain halide ion and organic by-product concentrations at a suitable level;

3.) compensate for a dilution of the developer (if there is a processing step before the developer);

4.) replace solution lost by carry-over.

The authors give equations that can be used for calculating proper chemical concentrations and rates of use for developer replenishers which lead to cost savings of 65% in the processing of Eastman Color Negative and Color Print films. The equations do not involve higher mathematics or tedious computations.

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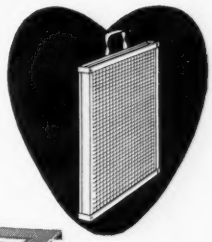

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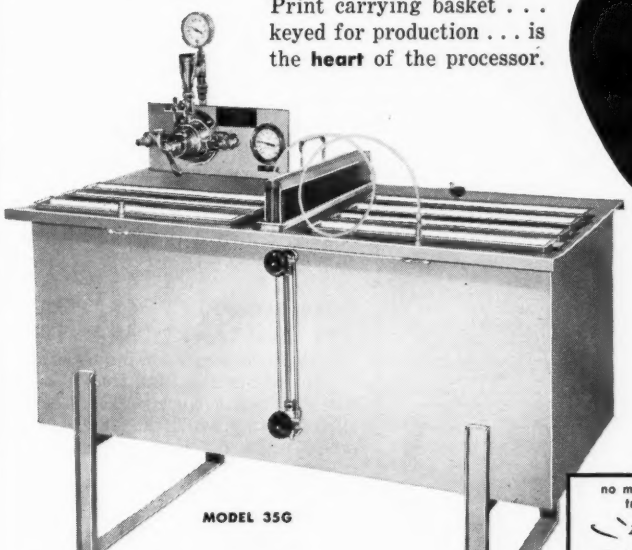

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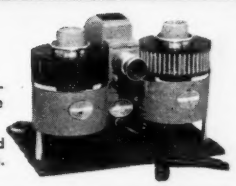

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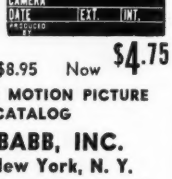

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continued from page 41

Water Soluble Film 126

Ulano Products Company is now marketing its Quik-dry Water Soluble Film for sharp-screen printing in the process shop. It is stated that long runs can be printed with various inking materials without breakdowns. The plastic base film is fast drying and permits quick cutting, peeling and has outstanding sharpness.

Table Clamps 127

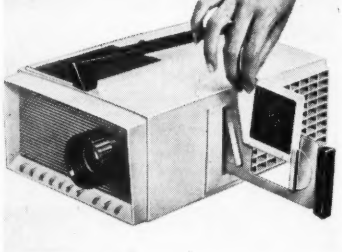
To secure heavy sheets of paper to a table during trimming or similar operations the *Plan Hold Corp.* has designed a spring-loaded, aluminum clamp which fastens to the table, while its jaws swing open gripping the paper and then automatically snapping shut when released.

Darkroom Kit 128

The Charles Beseler Co. has announced a Dream Darkroom Kit which includes everything for the establishment of a functional darkroom. Included are the Model 23C Beseler Enlarger with 4" lens, a roll film developing tank, an easel, an interval timer, a set of filters, and a set of negative carriers, as well as a score of other accessories, including print trays. Price is $195.00.

Mobile Studio Cabinet 129

A rubber-tired mobile studio equipment cabinet with spacious drawers and deep storage areas is currently being marketed by the *Simonsen Metal Products Co.* The handy storage area is made of embossed heavy-gauge steel, with an overall size of 35¾x28x18", and is equipped with a ribbed cover and six convenient drawers. The total weight of the model is 134 pounds,



Slide Adapter See 130

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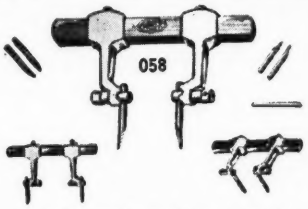

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. . . for more details circle 551, page 65

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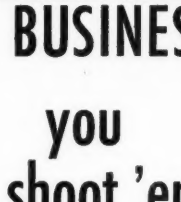

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. . . for more details circle 580, page 65

easily moved on ball bearing wheels 10 inches in diameter.

Slide Adapter **130**

Realist has come out with a Model 620 Slide Changer at $4.95 which will insert 2¼x2¼ Polaroid transparencies in the Model 620 Realist Projector. To show Polaroid transparencies in the projector, all that is necessary is to remove the standard changer and insert the new device.

Stereophonic Recorder **131**

Superscope Inc. is now marketing a new single-unit stereophonic recorder and playback system called the "Sterecorder." Included with the system are two Lansing Model D-123 12" speakers and two high impedance microphones. Portable, the unit has cueing and editing facilities, and comes with carrying cases. Retail price is $549.00.

Color Clipper Camera **132**

Ansco has announced the addition to its line of the new Color Clipper 120 with an f/11 hard coated doublet lens and aperture settings for both color and B&W. Complete with a travel case, it sells for $25.95, including a flash unit and viewer.

Deluxe II Light Meter **133**

Sekonic Electric Co. Ltd. is distributing through *Brockway Camera Corp.* a new model of its line of photoelectric light meters. The new unit is classed as the Model 36 for reflected light only with three levels of illumination, bright, dull, and dim. The meter is calibrated for ASA 6 to 12,000 and shutter speeds from 1/1000 to eight seconds. Complete with case it is priced at $11.95.

Cold Light Heads **136**

Five models of a new cold light

continued on page 73

Stereophonic Recorder See 131

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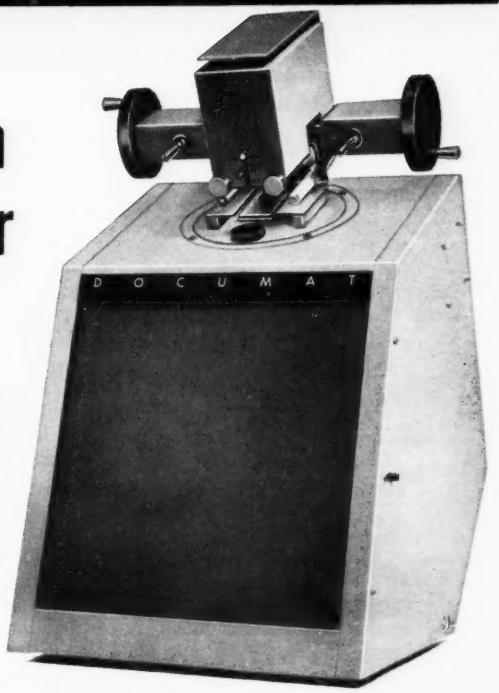

Here is a universal reader that will sharply magnify your microfilm—16mm, 35mm, whether on roll, jackets or aperture cards. Whether the images run vertically, horizontally, or upside down, the DOCUMAT reader will position them correctly and brilliantly on the high-contrast 11" x 11" screen. Finger-tip controls traverse and center your film for quick, easy reading. The DOCUMAT Reader weighs only 27 lbs. and is 24" high. Instantly interchangeable lenses and adjustable condenser for varying enlargements—34¼x, 24x, 15x.

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. . . for more details circle 557, page 65

WORKSHOP

continued from page 34

If you have worked on location—as many industrial photographers do—you have probably found out about latent image stability, and how sensitive to storage conditions and age *after* shooting the latent image can be. Again, I'd like to stress—these are not flaws in manufacturing. The manufacturers have done wonderful things in giving us the present day materials.

I like to use the analogy that making color film is like the making of fine wines or fine cheeses —the ingredients (many of them obtained from flexible Mother Nature) are put together in the same way each time, but an aging process of several months is required. Sometimes the results are superb, and sometimes the manufacturers do not even like to talk about certain batches. But, by and large, the film manufacturers are coming out on top most consistently, and when I see some of the results obtained on late Fall 1957 materials I must admit that we're lucky to have such stuff available. (I remember Luminère Autochrome Plates, do you?)

Aside from improved quality, the most outstanding feature of the present color materials lately introduced has been in their improved *speed* and pushability. Not only are some of the materials phenomenally fast, but many of them are also capable of being pushed. It is important to note that although good and excellent results are obtained with proper forcing, the *most perfect* color is obtained when the material is exposed according to the manufacturer's recommendations. This often means under conditions recommended by the manufacturer — conditions that are sometimes impossible to reproduce. But I must stress that although excellent results are obtained with some materials from special manipulation in processing, they are never as good as results obtained from recommended procedures.

Another factor that must be considered is the matter of pushing film speeds. Although films are rated with assigned Film Indexes for speed—the actual speed is also a factor of personal choice for density. For example, I know that certain photo-engravers produce best results for some of my clients when the transparencies are slightly on the dense or under-exposed side. Not dark, mind you, nor really underexposed, but at the point where there is full color saturation. Now, when I am shooting for reproduction by letter press or gravure, I may be tempted to accept as "standard" or "good" a transparency which would be darker than one which I would use for making separations for Dye Transfer, or, again, for slide projection. Which means that I have assigned three different densities to transparencies, and thus, several variants in true speed. So it is in pushing speed,

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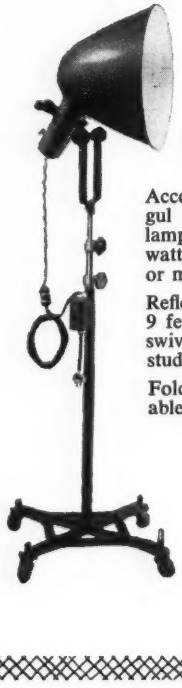

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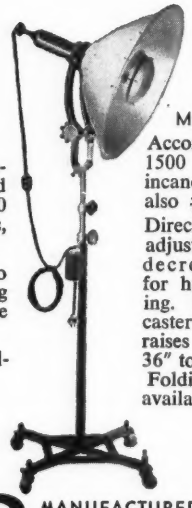

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what might be pushed for an acceptable density for one use, might not be considered pushed enough for another use. The inherent contrast of the color material and the subject is also a very important thing to consider.

Another Example

Take for example, the new Anscochrome sheet material which is soft and long scaled. Used to photograph a subject with a limited contrast range, I would find that it appeared to have great latitude, whereas if I used it for a subject in which there was a great variation in brightness range, I might find that it had little latitude at all. And Kodachrome, which has no permissible variation in processing at all, and therefore can not be pushed, can still be used as a standard for judging exposure and evaluating light output. No wonder that manufacturers of electronic flash equipment give Kodachrome guide numbers to set standards of comparison, for it is reliable and least subject to variations in processing techniques.

I have shown here a chart which was originally compiled for the aforementioned CCA book. I have not attempted to evaluate any material as a whole against any other. You just can't. We make use of these materials for the specific job on hand, and the limitations of equipment, budget, illumination, time, or whatever other factors might influence the job. These qualifications are personal and based on experience and a good deal of note-comparing with others shooting color. I hope you'll find the chart helpful.

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. . . for more details circle 515, page 65

continued from page 44

the recorder camera is obtained by reference to the numbered frames on each film.

Currently the photogrammetric pictures are reproduced for ready analysis with a field type stereo meter to 10x magnification. This size permits a 10-1 increase in photo base with a corresponding increase in interpretive accuracy. A new system is currently being developed which will, it is hoped, permit immediate interpretation without printing delays.

Further use of photographic techniques are employed in detailing the site itself. In this application oblique photos of the area are made at altitudes of 2000 feet, using a Fairchild K-20 aerial hand-held camera equipped with a 6" lens and minus blue filter. Speeds in the order of 1/500 per second are required for satisfactory reproduction.

For special phases of the survey several other types of photographic equipment are available. A B&H military-type gun camera is mounted in the nose of the aircraft to record the path along the line of flight where necessary, producing a standard motion picture film which can be projected for later study. A Pentacon 35mm camera equipped with a wide angle lens is also used in recording color shots of the area as is a Bolex 16mm hand-held motion picture camera with turret lens equipment. For instantaneous evaluation or recording of ground details the crew is equipped with a Polaroid camera and lens equipment for use as required.

One of the principal problems faced in this low level method of aerial surveying is the determination of the exact path which the plane took in flying between terminals. This has led to a further utilization of the vertical camera pictures, assembled in a strip map, which definitely establishes the relationship of the plane to landmarks on the ground.

Better than twelve years of testing has established the dependability of the technique described here. □

TURNPIKE

continued from page 27

preparation of all the movie films.

This footage was used widely by Florida television stations who were clamoring for films about the road's progress. The movies were also shown before numerous civic organizations and to prospective bond brokers.

Though great emphasis was placed upon promotion-publicity-public relations photography, the Turnpike Authority didn't overlook other uses. Photos were also taken of the progress of the various contracts, as a check on the performance of the contractors and for historical records.

"We found it better to have our own progress pictures taken," Hinton reports. "By so doing, we got a more accurate report. Naturally any contractor paying for the pictures only would have photographs taken of the sections which showed his work to the best advantage. However, we wanted to know what was happening everywhere, and with our own photographer we got such record coverage."

With the 108-mile section of the Turnpike now in operation —and revenues far exceeding estimates—the Authority is now turning its attention to the completion of the balance of the pike —280 miles by the end of 1958. Naturally, the operation plan picturewise will remain the same —utilize photography to the utmost. □

HIGH-SPEED

continued from page 19

case, the bulbs are wired in series.

Best results have been obtained by use of Tri-X negative film which is developed within the plant and made available for analysis only a few hours after being exposed. The ability of the Engineering Department to start corrective action in the shortest possible time materially contributes to the overall effectiveness of high-speed photography. □

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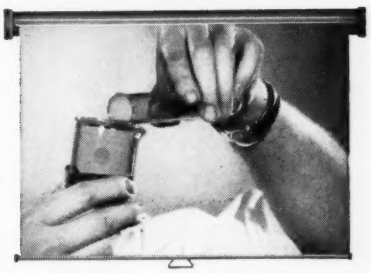

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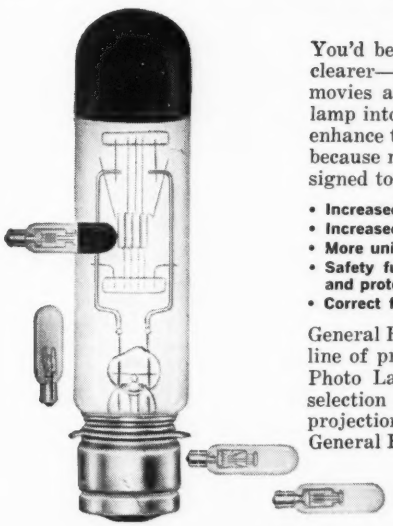

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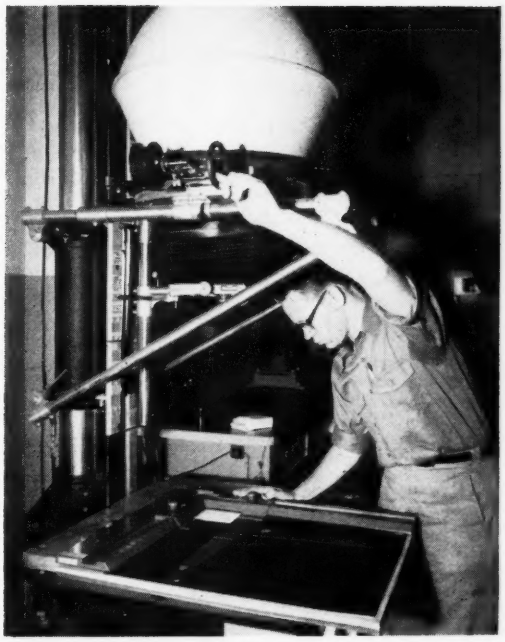

Requested to make an 8x10 enlargement of 35mm frame, photographer enlarges to 4x5 on process film, then makes sized print.

Microfilming, generally thought of only in connection with "dead" records, has a live potential as an active management tool for a public utility, according to the experience of the Detroit Edison Company.

In its photo department, an application of microfilming has enabled the firm to consolidate 50 file cabinets full of old photo negatives — dated over a half century—into a highly compact single file drawer.

Some industrial photo departments destroy old negatives after a reasonable time has elapsed. But photos of Detroit Edison's installations have too much historic and legal significance to be destroyed. Thus, the negative files ran a voluminous gauntlet back through almost 100,000 8 x 10 glass plates and film which made the storage problem ticklish.

Applying microfilm to solve this problem was based largely on recent experience of the Recordak people while making 35mm copies of x-rays at a hospital. The Detroit Edison photo people used a leased Recordak Micro-File Machine and 35mm film. The negatives were mounted for copying on a special x-ray light box.

SIMULTANEOUS COPYING

For maximum working convenience, the microfilming machine was set up so that the 35mm frame covered an 8 x 10 area. In cases where 4 x 5 or 2¼ square negatives were being recorded, four or eight negatives respectively could be copied simultaneously. Careful indexing both on the 35mm film boxes and at four points on each 100-foot roll of film makes the photographs easy to find.

By using Kodak 35mm Tonal Reproduction Film, photographers wound up with a positive image in their microfilm files. This reversal has actually proved an advantage in the handling of photo files. With positive film projected onto a Recordak film reader, company personnel interested in the negative file can usually make final selections from the microfilm. When the original negatives were on file, however, they almost ordered more prints than they needed, making selections later.

Now, when an order comes in for a print from the microfilmed photo files, the 35mm positive is blown up to make a negative on 4 x 5 Process Masking Film. This latter film was selected to add contrast to the fine 35mm image. From the 4 x 5, photographers make enlargements to 8 x 10 or whatever is requested. The 4 x 5 is then assigned a new job number and is carried forward in current active negative files.

A relative handful of old films and plates which had a particular historical significance for the company were retained in a special file after microfilming. All the tens of thousands of others, however, were destroyed.

Current plans call for microfilming every four or five years to keep accumulating negative files within bounds. Though the average size and bulk of negatives has decreased, usage of photography has increased. □

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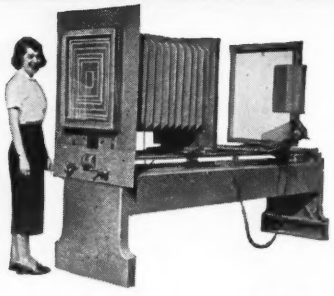

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. . . for more details circle 555, page 65

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. . . for more details circle 564, page 65

MOVIE CLINIC

continued from page 48

the screen can be viewed comfortably is limited.

There are two basic types of screens: beaded and matte. Matte screens allows greater latitude in seating arrangement than beaded screens since the angle of view may be greater, but beaded screens provide a much greater light reflective quality. In Navy, we have accepted the standards that for beaded screens, the audience should preferably be seated within approximately 20° on either side of the projection axis, and for matte screens within a 30° angle.

With respect to how close and how far the audience should be from the screen we use the standards of not closer than twice the width of the screen and not farther than six times the length of the screen. Thus the size and placement of the audience determine how large the room should be. All these factors are related in Table I.

Remembering that the standards dealing with view angles are "preferable" standards—the picture on the screen does not become invisible beyond the specified angle — the foregoing table permits the selection of the right size screen for the size of the audience. The distance to the farthest viewer also establishes the minimum dimension for room length.

From the standpoint of "which projector" and "projector placement," the choice is fairly wide. Once the choice is made however, there is no "preferable" standard—the factors of picture size and projector placement are subject to rigid formulae.

There are two primary types of projectors. The overhead projector whose characteristics require that it be placed in front of the audience; and direct projectors—film strip, slide and movie whose characteristics require that they normally be placed either to the rear or behind the audience. Most frequently, overhead projectors are operated by the speaker and are widely used for classroom work.

Overhead projectors are not customarily sold with a choice of lenses. For all other projectors, lenses may be procured in a wide variety of different focal lengths. Since the focal length of the lens

LENS FOCAL LENGTH	WIDTH OF PICTURE ON SCREEN						
	4'	5'	6'	7'	8'	9'	10'
4"	5.3	6.7	8.0	9.3	10.7	12.0	13.3
6"	8.0	10.0	12.0	14.0	16.0	18.0	20.0
8"	10.7	13.3	16.0	18.7	21.3	24.0	26.7
10"	13.3	16.7	20.0	23.3	26.7	30.0	33.3
12"	16.0	20.0	24.0	28.0	32.0	36.0	40.0
16"	21.3	26.7	32.0	37.3	42.7	48.0	53.3
20"	26.7	33.3	40.0	46.7	53.3	60.0	66.7
24"	32.0	40.0	48.0	56.0	64.0	72.0	80.0
26"	34.7	43.3	52.0	60.7	69.3	78.0	86.7
28"	37.3	46.7	56.0	65.3	74.7	84.0	93.3

Table 5. Distances for 3¼" x 4" slide projectors, aperture — 3".

NOMINAL SIZE	APERTURE SIZE	LENS F.L.	WIDTH OF PICTURE ON SCREEN						
			4'	5'	6'	7'	8'	9'	10'
5X5"	5"	6.5"	5.2	6.5	7.8	9.1	10.4	11.7	13.0
7X7"	7"	12.5"	7.1	8.9	10.7	12.5	14.3	16.1	12.9
9" Dia.	7"	14"	8.0	10.0	12.0	14.0	16.0	18.0	20.0
10X10"	9¼"	14"	5.9	7.4	8.8	10.3	11.8	13.3	14.7

Table 6. Distances of projector from screen for overhead projectors.

is the factor which determines how big the projected image will be at any given distance, this is an important consideration. Most of these projectors are equipped when sold with a lens in the middle of the range, and will serve normal needs very adequately.

The tables numbered 2-5 show the distances of the projector from the screen for picture widths from 4 to 10 feet and for the differing focal lengths of lens usually available for each of the most widely used types of portable projectors.

While a range of ¾" to 4" in focal lengths is shown in Table 2, manufacturers can supply lenses of many more focal lengths in the range between ½" and 4½". The factors affecting such additional lenses can be interpolated easily and adequately from the same table.

Most film strip projectors will handle either single or double frame film strips. Because the aperture area differs for each, the size of the projected image differs correspondingly.

Many projectors will handle both single and double frame film strips and also 35mm slides. In any case the projector characteristics are the same.

The 3¼"x4" slide projector is often available. Its characteristics are shown in Table 5.

The usefulness of overhead projectors to instructors and speakers is illustrated by the short distances required between screen and projector, which, in all cases is less than twice the width of the projected image. There are four widely used sizes of general purpose overhead projectors. Table 6 shows their characteristics.

With six tables, the mathematics of projection seem somewhat formidable and complex, but they really aren't. For any one problem, only two of the tables are necessary. By using Table 1 and starting with the number in the audience—say 50, one ascertains immediately that a five-foot wide screen is necessary, if beaded, and a four foot screen, if matte; and the room must be at least 30′ deep for a beaded screen, and 24′ for a matte screen.

With this information at hand,

continued on page 72

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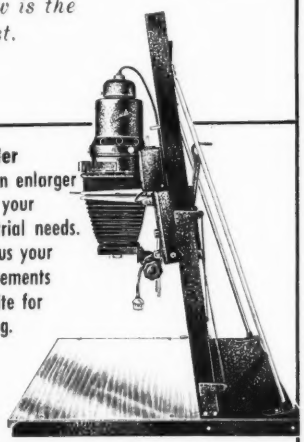

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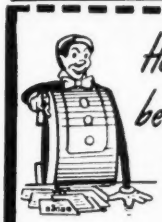

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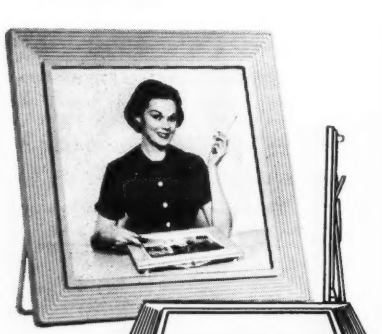

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New Free Literature

Keep posted on the latest developments in the photographic field. Each new product and supply item featured below has a key number. If you want more information on the subject — without any obligation — circle that same number on the Readers Inquiry Card on Page 65.

CAMERAS, LENSES, ACCESSORIES

Travegon **201**
Agof-Schacht Lens Corp. Data on lens for Exakta, Praktica, Pentacon. Automatic diaphragm with 65° angle of view.

Tanack 35mm Camera **202**
Kine Camera Co., Inc. Description of camera featuring f2/50mm coated, 6-element lens, 12 shutter speeds, 1-1/500.

f/1.9 200m Lens **203**
Ednalite Optical Co. Details on revolutionary f/1/9 200m lens with 9.5 to 28.5 local length. For 8mm cameras.

Floating Action Tripod **204**
Davis & Sanford Co., Inc. Leaflet on tripod with movie or still head. "Floating Action." Two models, large and small.

The Rolyn Snake Plier **205**
Robert M. Lynn. Data on handy tool for assembly and dismantling of optical, radio, scientific instruments and mechanical equipment.

TDC Stereo **206**
Bell & Howell. Description of automatic stereo camera and equipment including projector, table-top "project-or-view," hand viewer, slide changer.

Commercial Camera **207**
Burke & James, Inc. 8pp. Pamphlet listing specifications of new Princeton camera for enlarging, copying, and reducing. Operating directions given for horizontal and vertical positions.

Pro-16 Tripod **208**
U. D. Photo Engineering. Description of accessory to the Miller Fluid-Action tripod head. Illustrations, specification and prices.

View Camera **209**
Calumet Corp. Booklet describes 415 view camera which takes pictures as the eye sees the subject.

Rent-a-Long **210**
Long Equipment, Inc. Descriptive information on renting services for any type of photographic equipment.

LIGHTING

Studio Lights (P-57) **211**
Smith-Victor Corp. Folder on lighting equipment for the professional. Prices listed.

Photographic Lamp Catalog **212**
General Electric. 20 pp. A complete line of lamps for all photographic purposes. Illustrations, descriptions, applications and technical data.

McAlister Catalog **213**
J. G. McAlister, Inc. 24 pp. Completely illustrated, describes entire line, including lamps, stands, light controls and dimmers, accessories.

Catalog F **214**
Mole-Richardson Co. 40 pp. Catalog presents complete line of products, with features and specifications. Illumination tables for spot and flood lamps included.

Lighting Equipment Rental **215**
Charles Ross Inc. 4 pp. Illustrated catalog. Complete schedule of rental rates on lighting, grips, props and D. C. generator trucks.

VIEWERS, PROJECTORS, SCREENS, SLIDES

Sequence Labels **216**
R. P. Cargille Laboratories. Numbered 1-5000, self-adhesives. For transparencies, prints, x-ray and other films. Samples on request.

Selectroslide **217**
Spindler & Sauppe. Features drum-shaped, interchangeable magazine for 48 slides. Two speed automatic or remote control projection.

Instruct-o-matic **218**
Viewlex Inc. Description of projector provides automation for 2x2 and Bantam slides.

Photographic Equipment **219**
Compco Corp. Catalog featuring table viewer and editor, "aireated" slide mounts, stereo projector, contact printer, enlarger, etc.

MICROFILMING

Microfilm Reader **221**
Graphic Microfilm Corp. Data on device permitting reading Film Sort IBM Microfilm Aperture cards on Eastman MPE Reader.

Microfilm Flow Camera **222**
Documat Inc. Eliminating operator error with automatic devices. 16mm office model has throat which accepts ¼" thicknesses.

Microfilming and You **223**
More and more companies are discovering that microfilming is a "must." How this technique can help in your department.

CINEMATOGRAPHY

Motion Picture Recording **224**
Magno Sound. Information on motion picture recording mixing, transfers, narration magnestripping.

Optical Track Prints **225**
G. W. Colburn Laboratory, Inc. Data sheets describe firm's service of making movie prints from 16mm films and various forms of magnetic sound recordings.

Low-Cost Business Films **226**
Telefilm Inc. Booklet on do-it-yourself production plan that lowers cost of business films.

Cinephonic **227**
Magnetic Sound Camera Corp. 4 pp. A hand-held single system magnetic sound camera for 16mm films. Portable power supply available.

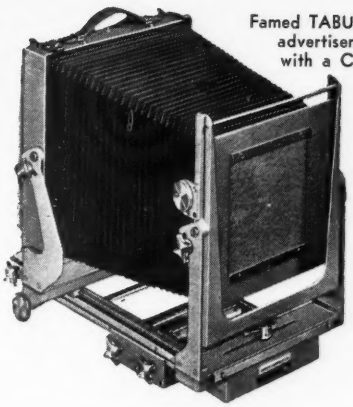
Film Editing **228**
The Camera Mart, Inc. Illustrated pamphlet on editing tools—tightwind adapter, viewer, etc. Prices.

Rear Projection Screens **229**
Stewart-Trans-Lux Corp. Optically engineered and precision manufactured in 5 types. Sizes and prices listed.

Ediola Viewer, Reader **230**
S.O.S. Cinema Supply Corp. 4 pp. Folder with diagrams, specifications of 16mm action viewer and sound reader.

Uniglow **231**
Radiant Mfg. Corp. Information on projection surface which allows a 100% viewing angle without any noticeable light loss.

Sound Services **232**
Metropolitan Sound Service, Inc.



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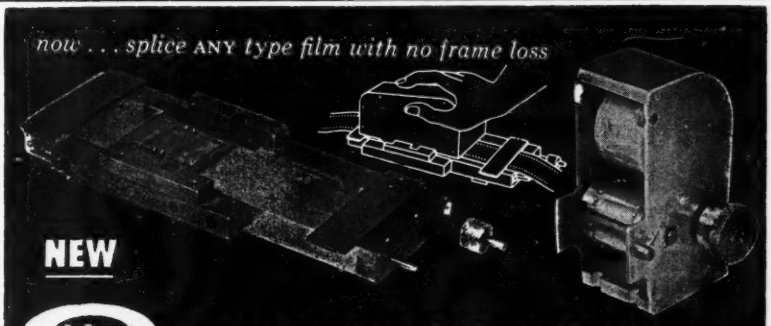

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Information on re-recording, transferring and other post-production services.

BOOKS

Focal Encyclopedia **234**
Macmillan Company. Folder on Cyclopedia. Topics cover equipment and material; lenses and optics; camera techniques; cinematography.

Photo Dictionary **235**
Morgan and Morgan, Inc. Information on book containing photographic and motion picture terminology, illuminated definitions, chemical glossary.

INSTRUMENTATION

4B Camera **236**
Photo-Sonics, Inc. Catalog describing camera which takes 2800 pictures per second on full frame 35mm.

K-5 Oscillotron **237**
Beattie-Coleman, Inc. Technical information on camera recording system. Specifications and prices.

M-16C Motion Analyzer **238**
Vanguard Instrument Corp. Description of camera with provision for mounting automatic data readout to X, Y and frame count outputs.

Densitometer **239**
Fotomatic Corp. Literature presents uses, specifications of densitometer. Measures light sensitivity, calculates exposure time, aperture settings.

Hulcher 70 **240**
Charles A. Hulcher Co., Inc. Information on fast sequence camera with sequistrobe flash — 20 per second.

GRAPHIC ARTS AND REPRODUCTION

"Better to Serve You" **242**
Lithographic Technical Foundation. Brochure presents laboratory and services of foundation.

Photocopy Papers **243**
Ampto Inc. Data on photocopying machines, transfer papers and films, processing supplies.

Ozalith **244**
Ozalid. 4 pp. Illustrated presentation on sensitized positive aluminum and paper offset plates.

Graphic Arts Focal Point **245**
Ilford, Ltd. 24 pp. Journal of technical information for craftsmen engaged in the production of printed illustration.

Dual-Lith Supplies **246**
Davidson Corporation. 36 pp. Illustrated catalog on supplies, auxiliary equipment and attachments for offset printing and duplicating.

Tri-Color Camera **247**
Robertson Photo-mechanix, Inc. Complete description and specifications on camera which handles templates up to 5x12'.

N-20 Arc Lamp **248**
NuArc Co., Inc. Data sheet describing arc lamp and vacuum printing frame combination for production of offset plates. Specifications and prices.

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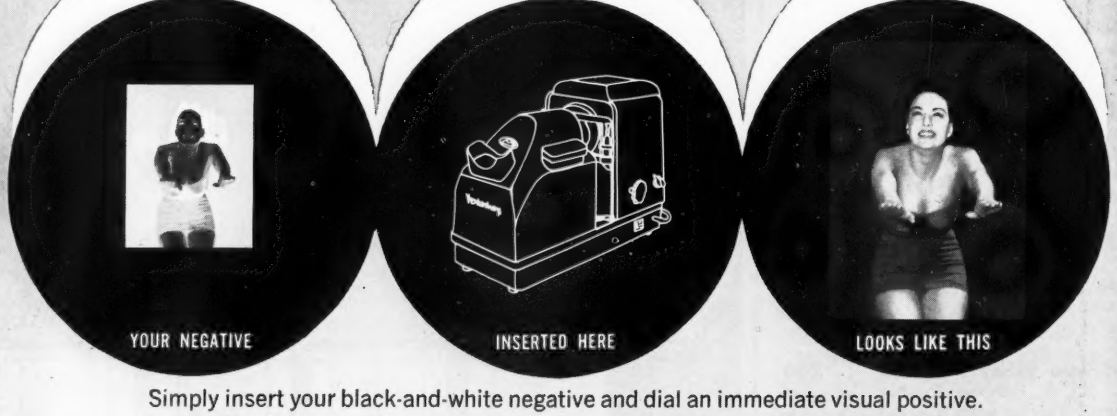

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SCALE MODELS

continued from page 29

the negative, with a subsequent underdevelopment to get the desired flatness in the Kodalith.

Size and scale of the Kodalith enlargement made from the original negative are controlled by marks on the model. The enlarger merely brings these marks on the image to a predetermined dimension that sets the print size.

To enable our draftsmen and construction workers to make an easy transition from conventional drafting methods to photo drawings, we made the new drawings as similar as possible to our existing type of piping drawings. Photo drawings can be made to any size, but to match Fluor's four-size sheet all positives are enlarged to a maximum of 24x36 inches.

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We have heard no severe criticism of the photographic drawings from our field force. In fact we can now give them more information than before. Individual isometric spool drawings of an entire run may be referred to for specific detail, with Kodalith plan views giving a composite picture of the individual lines in a piping area. The new isometric Kodalith drawings show an entire plant or unit in one easy - to - understand picture and the model itself, which is on the job site, may be consulted for continual reference and study.

Using only this type of piping drawings, Fluor to date has constructed two plants having an approximate value of $15 million.

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IP ARTICLE NEWS SPEECH PHOTO } Briefs

QUALITY AND QUANTITY FOOD CONTROL BY COLOR PHOTO

Standards of food appearance and portioning are maintained at the Salad Bowl Restaurant, Bakersfield, California, by color photographs of approved dishes. Pantry girl checks prepared salad against card file.

Manhattan Printing Forum

Nearly 700 people attended the recent Manhattan School of Printing Forum on new techniques and developments in photography. The forum, held in the school's offset division, consisted of demonstrations in the school's shops and a panel discussion by representatives of the Haloid and Xerox Corp., the Gevaert Co. of America, Inc., Chemco Photo Products, Ilford, Du Pont and the DiNoc Corp.

Deep Sea Photos

According to the Moscow radio, Russian scientists last summer were reported to have taken photographs 18,300 feet beneath the Pacific Ocean. It said the pictures were taken off the coast of New Guinea from a research vessel.

Photo-Journalism Short Course

Problems of newspaper and industrial magazine photography will be emphasized during Kent State University's 17th annual Short Course in Photo-Journalism to be held March 18-21, 1958. Subjects to be covered by discussion and demonstration include Use of 35mm Equipment by Newspapers, Correct Exposure and How to Get It, Celebrities and What to Do About Them and Color for Newspapers. There will also be demonstrations on lighting and posing informal group pictures.

Program chairman for the course has been Vernon Cady, director of color and advertising photography for the Cleveland Plain Dealer. Professor James A. Fosdick of the Kent State School of Journalism is University Director.

Photo-Lab-Index Supplement

Supplement No. 73 of the Photo-Lab-Index, published by Morgan & Morgan, Inc., includes data on European Agfa and Perutz products and American FR Developers. The supplement also contains 35 new or revised Time-Gamma-Temperature Development Charts, plus information on the Anscochrome Professional 16mm film. Registered P-L-I owners can obtain the supplement from the publishers at 101 Park Ave., New York 17, N. Y. The price is $4.00.

R. P. Loveland Honored

Roger P. Loveland, Kodak Research Laboratories was recently honored for his contributions to microscopic science by the N. Y. Microscopical Society.

Extended Dimensions

Ad in British wide-screen movie house: "Gina Lollabrigida, bust, 190"; waist, 125"; hips, 195"!"

Doscher To Lecture

John W. Doscher, FPSA, FRPS, photographic teacher and lecturer, is preparing a series of lectures for the early 1958 season. Sponsored by Carl Zeiss, Inc., the lectures will be held in Richmond, Atlanta, Chattanooga, Nashville, Memphis, New Orleans, Houston, Corpus Christi, San Antonio, Dallas-Ft. Worth, Oklahoma City, Tulsa.

Free tickets and information is available at local authorized Zeiss Ikon dealers.

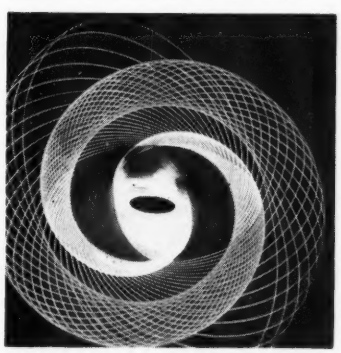
Baunach Wins Award

An eye-pleasing color transparency—"Hi-Fi in Focus"—has won for A. M. Baunach, Bethlehem Steel Co. photographer, first prize in the RCA Victor Record-Canon Camera Co. record cover contest which drew about 15,000 entries.

The geometric abstraction (see cut) was selected by contest judges inasmuch as it gives a visual dimension to the theme of the contest: a color photo accentuating the electronics of high-fi. The 2¼" transparency was made by suspending a flashlight lamp and battery taped together before an open shutter camera. As the light source lightly swung its pendulous orbit for a five-second exposure, Mr. Baunach switched red, blue, and yellow cellophane swatches before the lens.

Considerable experimentation, of course, was necessary to achieve the final pattern selected, looking curiously like the iris—lens of the camera itself.

Prizes including a Canon VT De-Luxe 35mm camera and an RCA Mark III television set were presented to the award winner by Mr. T. Matsui, president of Canon Camera Co., in New York City.



B&W cut of color abstraction which won RCA-Canon contest.

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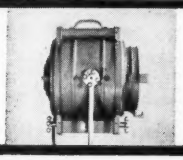

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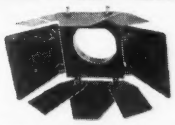

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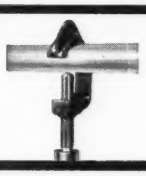

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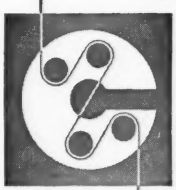

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MOVIE CLINIC

continued from page 61

and the screen to be used selected, it is only necessary to look at the projector and determine the focal length of the lens. This factor can then be checked out on the appropriate "projector to screen length" table to make sure that it isn't necessary to chop a hole in the back wall to get enough distance to project the right size picture.

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continued from page 30

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NEW EQUIPMENT

continued from page 53

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99 Photocopy Machine 138

The *Copycat Corp.* has disclosed a small, light-weight (18 lbs.) photocopy machine which is controlled by a single dial, automatically to reproduce virtually any copy in seconds. Said to incorporate a new precision control for the light source, the model is designated as Model 99 and retails for $199.00.

Fine Grain Developers 140

Agfa is now distributing through its dealers in the United States its Rodinal and Atomnal-New developers. Both are highly-concentrated for all types of black and white, while Atomnal-New is for ultra fine grain developing. Standard size packages are available.

Electric Slide Changer 141

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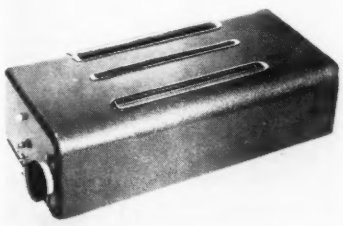

99 Photocopy Machine See 138

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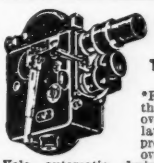

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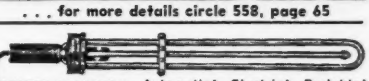

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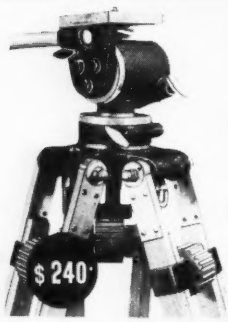

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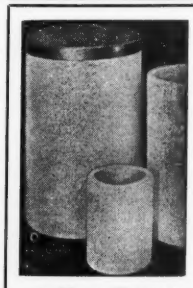

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